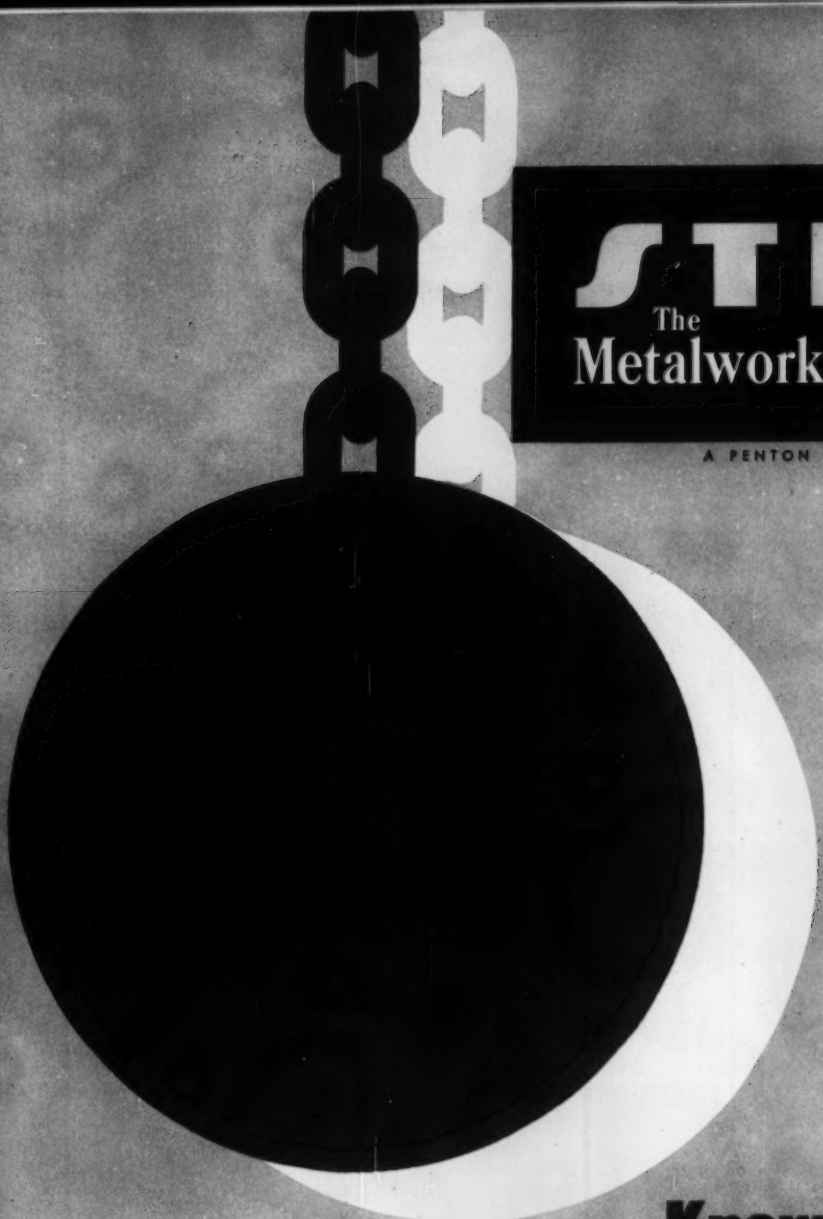
MARCH 19, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION



A PROGRAM FOR MANAGEMENT IN 1956 . . No. 2

Know Your Costs

By finding out where your money goes, you can put profit into your prices, sharpen your efficiency . . . page 83

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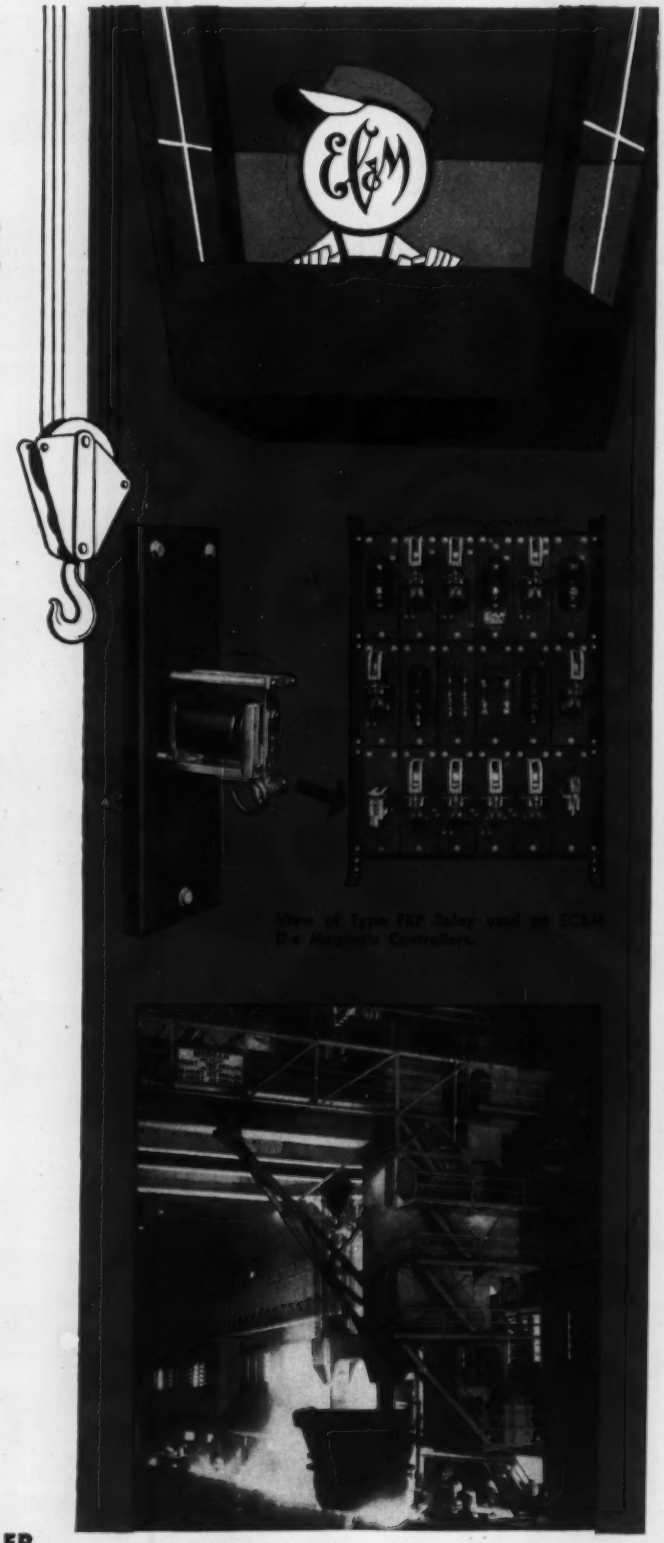
When Stopping D-C Motors . . . EC&M's Rectifier Plugging Control System gives FULL PROTECTION

This is the simplest of plugging control systems for d-c mill and crane drives. Only a small rectifier and single-coil, mill-duty relay are required. They are connected across the motor armature for operation by counter-emf. The relay allows the Plugging Contactor to close immediately when starting from rest. When reverse-power plugging is applied to stop the motor, the rectifier permits the relay to pick up and hold open the plugging contactor. As the motor reaches stand-still, the relay drops out to close the plugging contactor and allow acceleration in the opposite direction.

The advantages of EC&M Magnetic Control are many. Ask an EC&M Engineer to explain the improved operation of d-c motors by Rectifier-Plugging.

Reasons why Motor Drives are better protected . . .

1. Positive response — relay operates directly from counter-emf of motor.
2. Reliable operation — unaffected by line voltage variation. Unaltered if taps on accelerating or plugging resistors are changed.
3. Full protection — relay picks up at any speed above 10% of F.L. motor speed. Drop-out occurs as motor reaches standstill.
4. Simplicity — a single-coil relay, a small rectifier, no electrical interlocks.
5. Reduces maintenance — relay does not require adjustment-maintenance.



View of Type PRP Relay used on EC&M D-c Magnetic Controllers.

Two-step Plugging Controllers are available for use on heavy inertia loads, such as ore bridge trolleys and ladle crane bridge motions.

THE ELECTRIC CONTROLLER & MFG. CO.

Division of Square D Company

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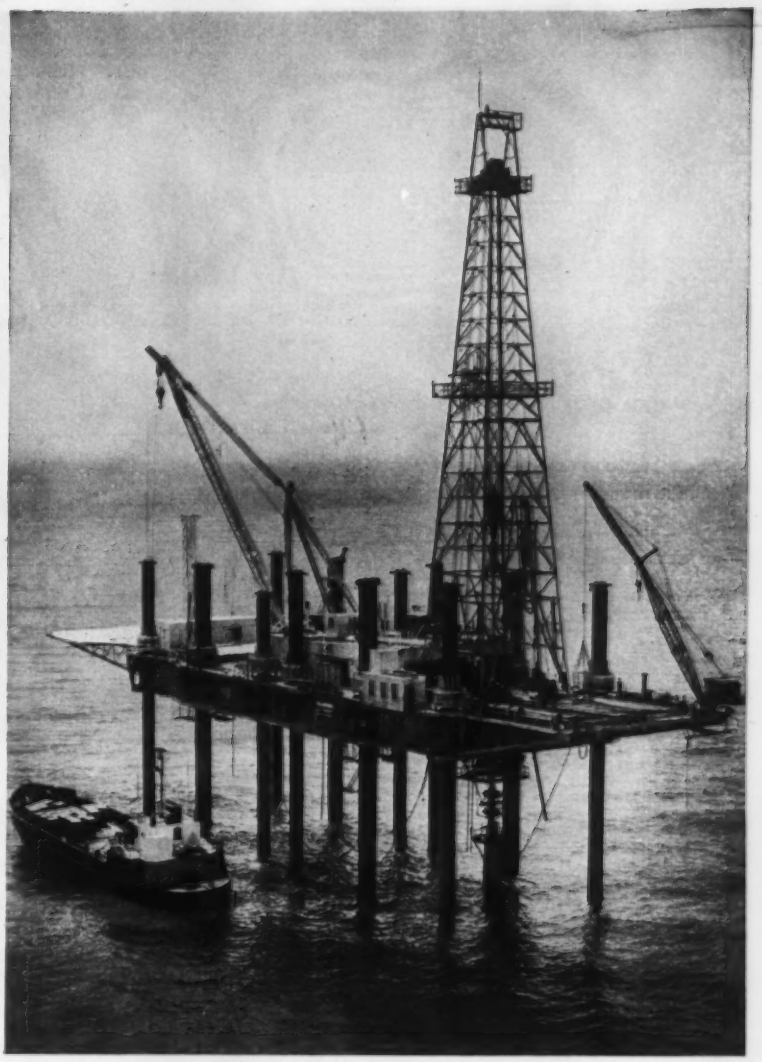
6232

"Mister Gus" stands firm through 41 hours of storm

Out in the Gulf of Mexico a steel giant known as "Mister Gus" probes for petroleum riches in the fabulous undersea oil fields. Named for its owner, Mr. Gus Glasscock, of Corpus Christi, this remarkable mobile drilling platform was especially designed to weather the terrific buffeting of seasonal hurricanes.

To provide the tremendous strength required, over 200 tons of Mayari R high-strength, low-alloy normalized steel were used at strategic points in Mister Gus' anatomy. With a yield point of 50,000 psi this steel is 50 pct stronger than structural grades of plain carbon steel.

Shortly after drilling was started at one location a full-dress storm bore out the wisdom of incorporating Mayari R in the structure. Winds barreled into Mister Gus at a 60-mile clip, and rolled up waves as high as 25 ft. Yet through 41 continuous hours of this, Mister Gus neither budged nor settled an inch; operations were calmly resumed immediately after the blow died down!



Designed and built by Bethlehem's Shipbuilding Division at Beaumont, Texas, this drilling platform has been drilling in a record 84 ft of water. Capable of working in 100-ft waters, it is also designed to be movable from one location to the next.

Mayari R can be valuable in a wide variety of applications, and poses no unusual problems in the shop. It can be welded, flame-cut, formed and machined with essentially the same procedures as would be used with milder steels. It offers from five to six times more resistance to atmospheric corrosion than carbon steel. Catalog 353 carries a complete description of Mayari R high-strength, low-alloy steel as well as dozens of illustrations and case histories. Our nearest sales office will gladly furnish you a copy.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

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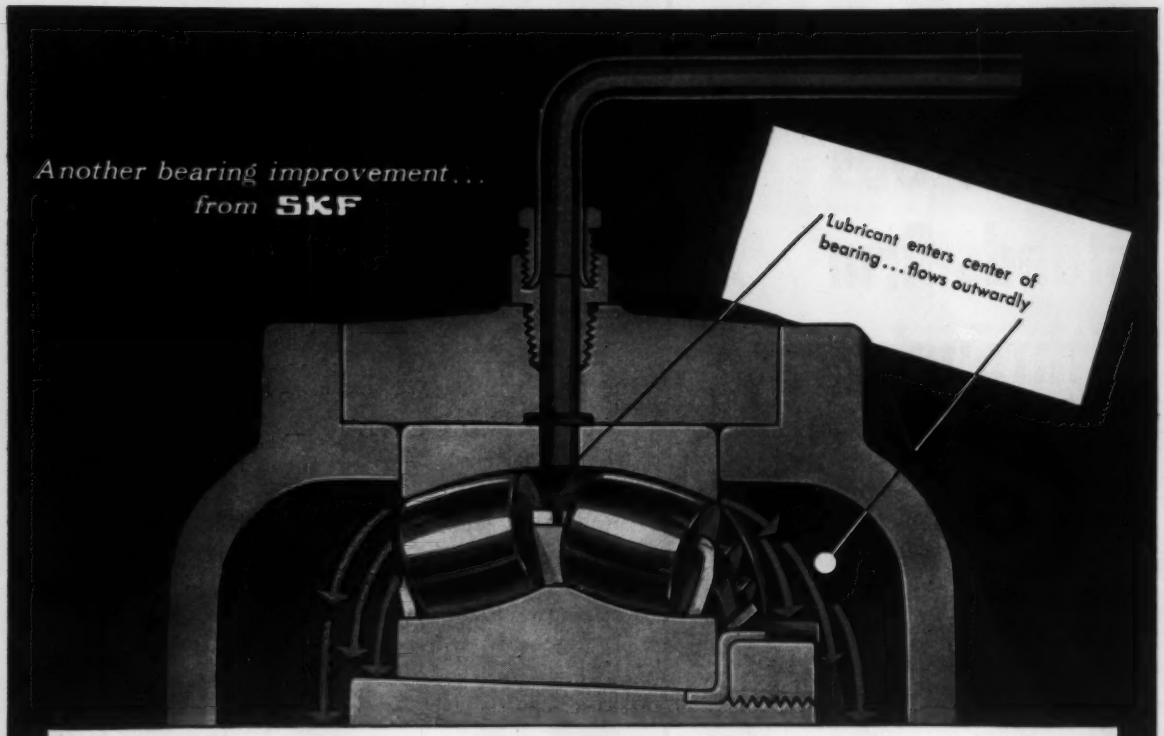

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SKF's improved method of lubricating large spherical roller bearings

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This is another example of how **SKF** helps you to obtain longer bearing life.

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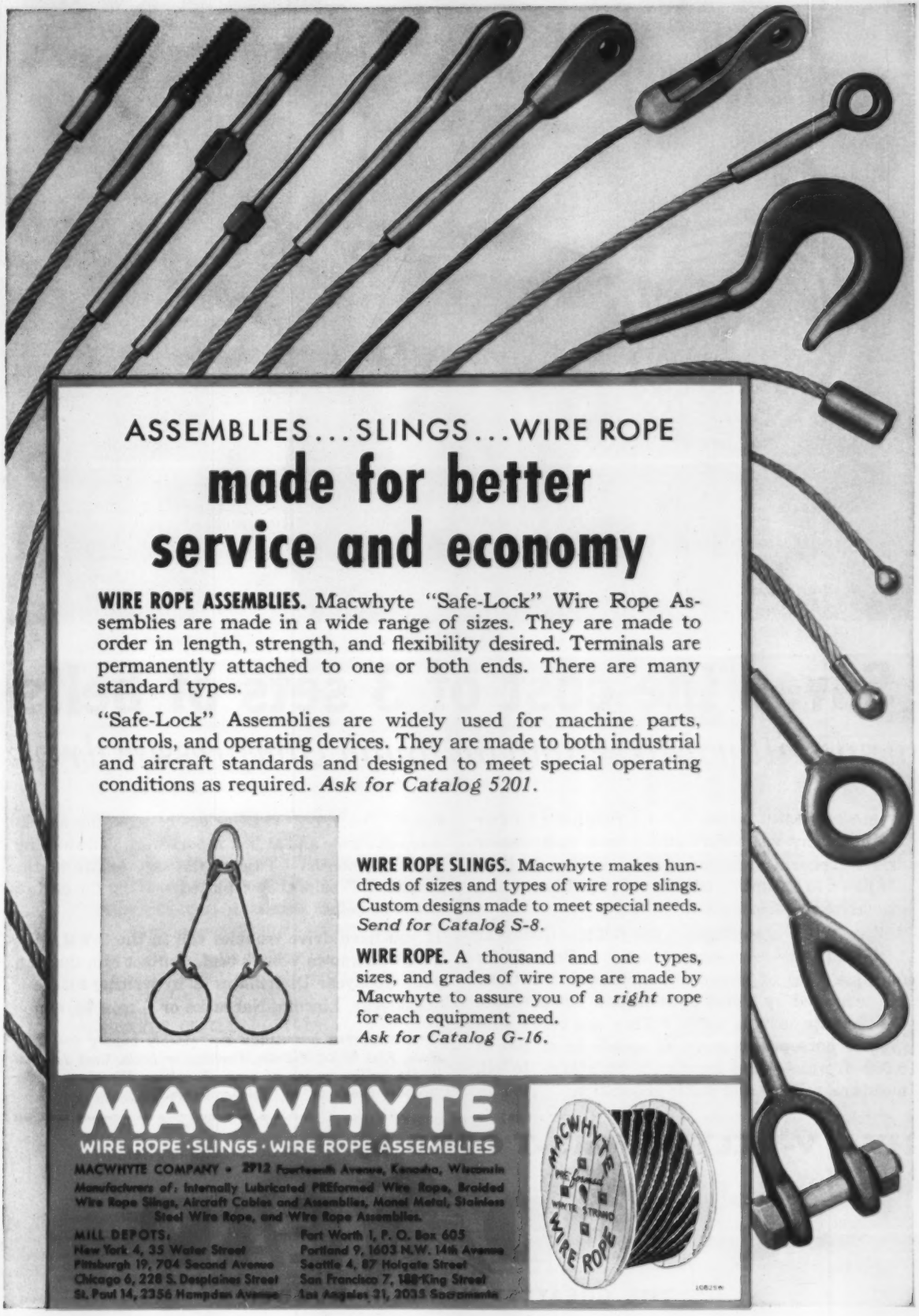

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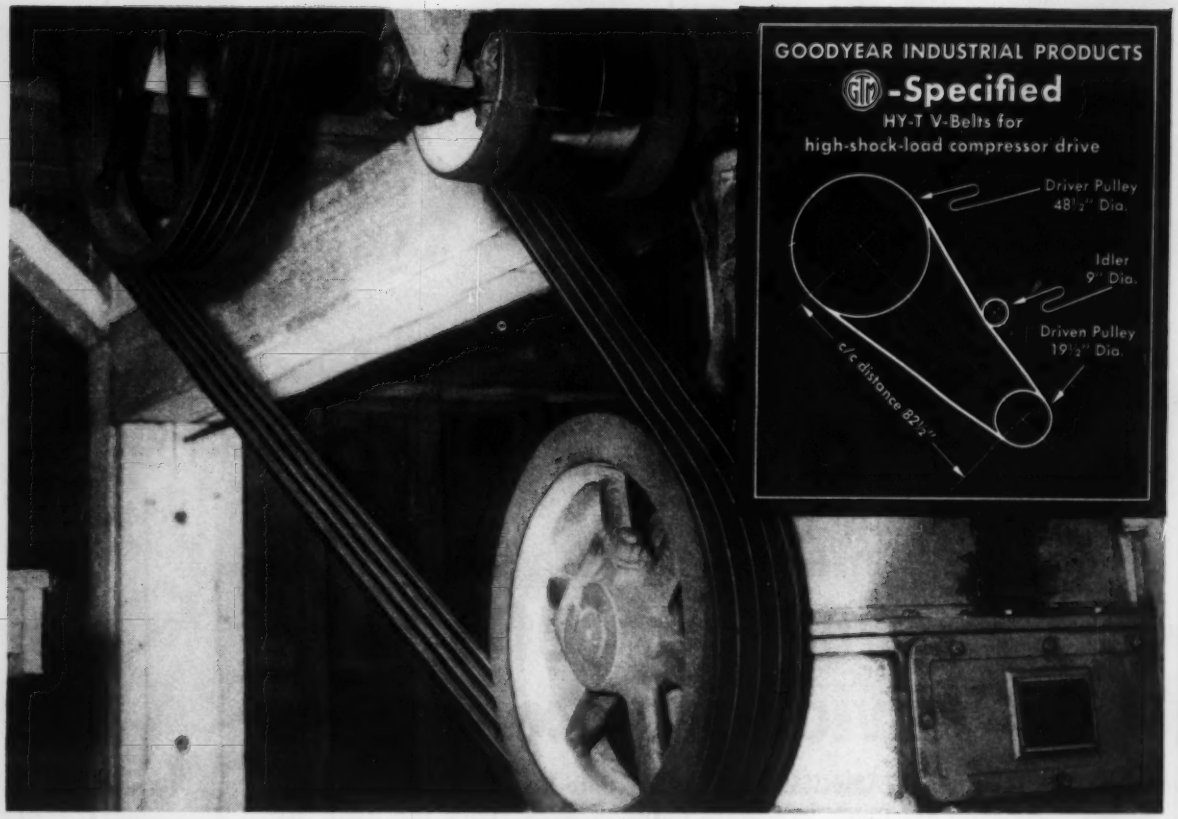

Saved the cost of 3 sets of belts

and still going strong on tough compressor drive

BELT-BREAKING problem for a Southern lumber company was overloading on a compressor drive. Frequent and sudden shock-loads kept belt-life down to 6 months, meant costly shutdowns and expensive replacements.

Called in for consultation, the G.T.M.—Goodyear Technical Man—recommended HY-T V-Belts. Their multiple plies of chemically produced 3-T CORD are tempered by Time, Tension and Temperature to eliminate surplus stretch. They can carry 40% greater horsepower loads at speeds from 100 to 6,000 f.p.m.—have maximum resistance to oil, moisture, mildew and static generation.

Result: The HY-T V-Belts easily took the shock-loads in stride and at last report were still running after 24 months—4 times the service life of the standard V-belts they replaced—saving the cost of 3 sets of belts.

If you have drive troubles call in the G.T.M.—the man who knows V-belts best. Contact him through your Goodyear Distributor or by writing to:

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HY-T V-BELTS with 3-T CORD by

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THE GREATEST NAME IN RUBBER

STEEL
The Metalworking Weekly

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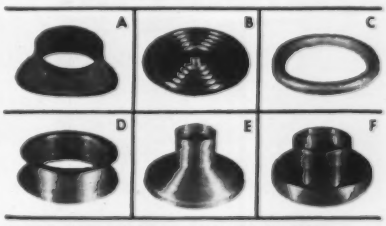
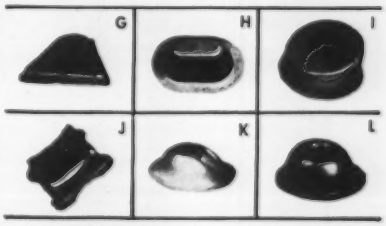


METAL SPINNING AND SPINFORMING:
Typical items: A—Aircraft detail; B—Decorative cover; C—Retainer ring; D—Winding reel; E—Electronic shield; F—Electrical detail.



HYDROFORMING:
Typical items: G—Aircraft detail; H—Spindle cover; I—Aircraft detail; J—Auto bracket; K—Light reflector; L—Air cleaner.

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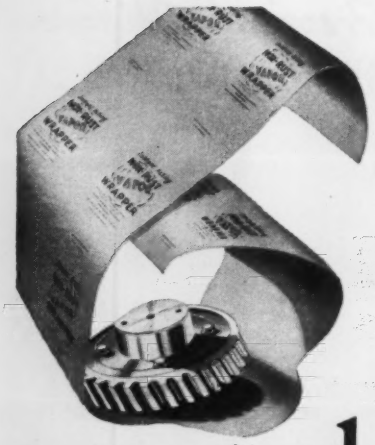

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behind the scenes

Such Pelott Smith Franz Crawford

Colorado Journey

In 1854 a band of Ute Indians carefully dressed themselves in correct massacre outfits, swarmed (possibly the past tense of swim) across the Arkansas river into Pueblo, Colo., and eagerly murdered everybody in sight. One hundred two years later Irwin Such, editor-in-chief of STEEL, and Leon C. Pelott, the publication's Chicago manager, draped themselves in mufti, swarmed into Pueblo, and, to show that history doesn't necessarily repeat, didn't murder anybody. Conducted by Colorado Fuel & Iron Corp. officials, A. F. Franz, president, and Rudolph Smith, works manager, they inspected the firm's Pueblo facilities.

In the photograph, Pelott, second from the left, appears to be delivering one of his witty remarks to Mr. Smith and Mr. Franz. Clay Crawford, assistant superintendent of the seamless mill, at far right, seems to doubt his ears.

Such addressed the ninth Broadmoor Conference of manufacturers and distributors assembled at the Broadmoor hotel in Colorado Springs. He told them that CF&I had expanded its capacity at Pueblo by 70 per cent since prewar, and that this expansion was typical of western industrial growth.

Tongue Twister

Walter Carroll, metallurgical engineer, Republic Steel Corp., Cleveland, sent us a clipping from the financial page of the *New York Times* of Feb. 10, 1956. Naturally, his interest in those formidable columns stamps him as a man of exceptional perception, so it was no wonder that his eyebrows shot up under his hair when he read (concerning a new hearing aid): "It requires no batteries, wires, ear button or external amplifier. Transistors, those tiny geranium workhorses, substitute for vacuum tubes . . ."

"I know people have labored assiduously in their flower gardens," Mr. Carroll wrote, "but as yet have not heard of anyone being called a 'geranium workhorse.'"

Doctor is Treed

Dr. Al Gray, technical editor, who often quotes his baby-sitter's remark about himself ("he's the kind of a doctor who doesn't do anybody any good") brought in a letter from W. O. Nussear Jr., sales promotion manager, Superior Tube Co., Norristown, Pa. Taped to the letter was a short length of OFHC copper tubing, a composite of a round tube drawn over two half-round tubes, having a mechanical bond. Superior sold this tubing in 16-ft lengths to a research laboratory. "But we don't know," complained Mr. Nussear, "what the application is, or how they joined the tubes together."

The tubing can carry two different types of liquids or gaseous materials at the same time, but the research people won't talk. Dr. Gray is at a loss, too. "Even if I knew," he said. "I'd have to clam up. That laboratory is doing Navy work."

Shrdlu

(Metalworking Outlook—Page 41)

FREE... Aluminum Facts from FRASSE

IF you're involved in aluminum procurement or fabrication . . . you should have this new illustrated brochure prepared by Frasse.

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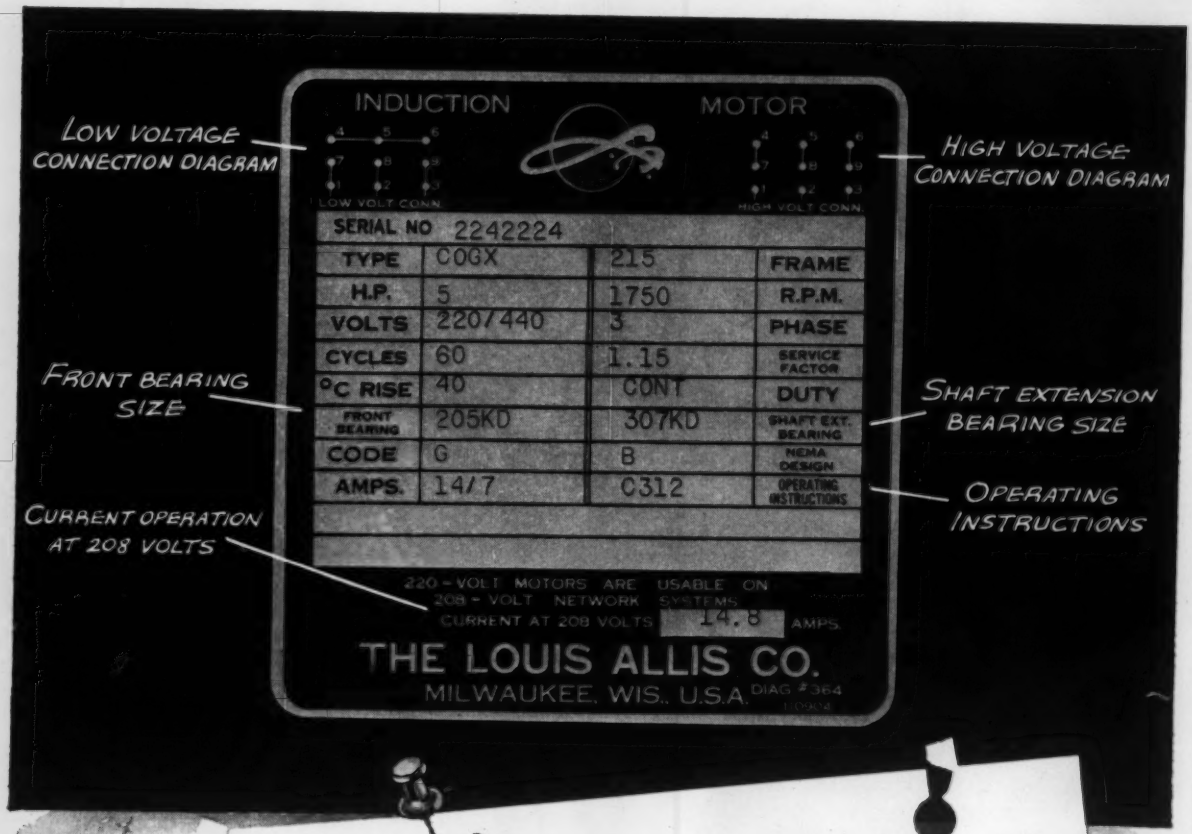
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INDUCTION MOTOR
HIGH VOLTAGE CONNECTION DIAGRAM
LOW VOLT CONN.
HIGH VOLT CONN.
SERIAL NO 2242224
TYPE COGX 215 FRAME
H.P. 5 1750 R.P.M.
VOLTS 220/440 3 PHASE
CYCLES 60 1.15 SERVICE FACTOR
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FRONT BEARING 205KD 307KD SHAFT EXT. BEARING
CODE G B NEMA DESIGN
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- Spare bearings can be easily ordered from bearing size and type designations on nameplate, thus eliminating disassembly of motor to determine bearing size. Bearings used are conservatively rated for long life.
- No more lost connection diagram since this information is simply and clearly shown on nameplate. This combined with permanent lead markings, assures that correct motor connections can always be made.
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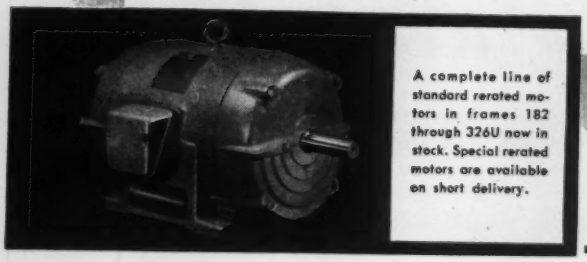

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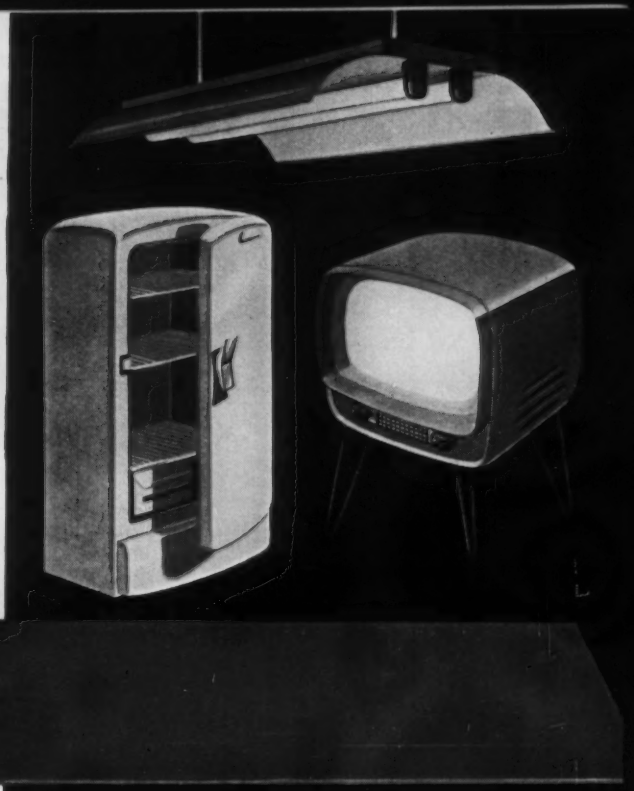

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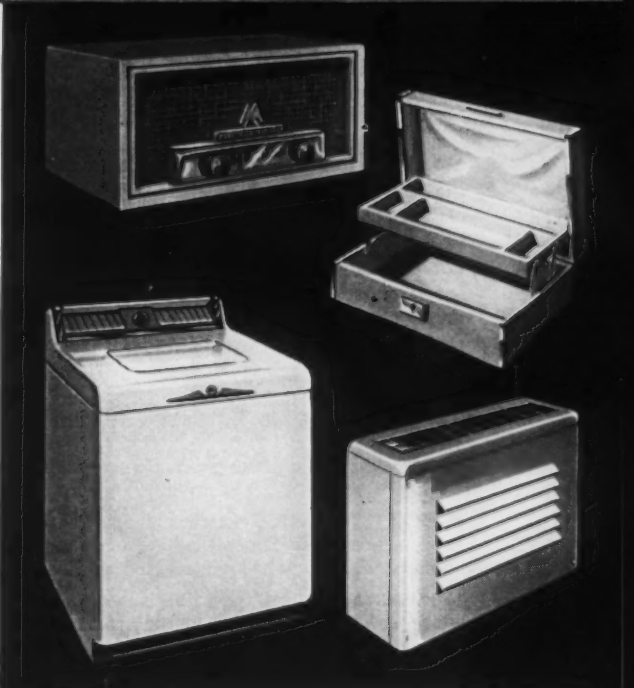

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LETTERS
TO THE EDITORS

Testing of Thermocouples

I am interested in your article, "Thermocouples" (Feb. 20, page 135), part II in your series on temperature control of heat treating furnaces. I would like two copies of the six articles in the series.

Not infrequently I have to use as many as 40 thermocouples, mostly chromel-alumel. Lack of a simple but adequate method for testing the accuracy of thermocouples seems to haunt me continually. I have collected data on faults of thermocouples and check methods for accuracy of readings and would be happy to exchange notes with others interested. I am a metallurgist at the Pittsburgh station of the Bureau of Mines.

Nicholas Derick
17 S. Sixth St
Duquesne, Pa.

Aluminum Trim on Cars

Your article, "Automakers Take to Aluminum Trim" (Feb. 27, page 110), is informative. I know many of our personnel have not had the opportunity to read it and file for future use. I would appreciate three copies.

Edward E. Kawana
Industrial Engineer
R. D. Werner Co. Inc.
Greenville, Pa.

Appraising Business Health

Your editorial, "Milestones or Millstones" (Feb. 27, page 67), continues (if you will pardon my saying so) to perpetuate what I think is an erroneous way of appraising the financial health of a business.

I do not think net profit stated as a per cent of sales really means anything. The only figure that has meaning is return on investment—and that, of course, will depend on how often a business turns its capital in the course of a year.

The steel industry, for example, has about a twice a year turnover. Republic is on the books at $600 million and does $1.2 billion worth of business.

One of our oil country distributors was telling us the other day of his 1955 results. He did $20 million worth of business and earned $600,000 net—or 3 per cent on sales. However, he has only $2 million invested in the business, so his net profit is a 30-per-cent return on investment.

I do not know how often the average steel warehouse turns its capital, but if it is properly managed, it should

(Please turn to page 12)

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Backward to *Forward!*

ALEMITE AIR-OPERATED TRANSFER PUMP

gives 63% faster lubricant transfer

...saves right down the line!

The *real cost* of plant lubrication is not just the *lubricant* alone! Actually, it's the time and labor needed to get the lubricant *out* of the original drum—*into* a bucket pump or powergun—and then *applying* it to machine bearings. That's where the real costs add up!

And that's why an Alemite Air-Operated Transfer Pump can cut costs in your plant—especially if you are using old-fashioned hand methods of lubrication. It transfers 37 pounds of pressure gun grease *per minute*—direct from the original drum—completely sealing the lubricant at all times—protecting against mess, waste and contamination.

It's fast—and versatile! It can even handle alcohol, cutting oils, kerosene—almost any non-corrosive non-abrasive fluid you use by the drum. Delivers light fluids at a rate of up to 15 gallons per minute!

There's no better way to speed up your handling of lubricants—because an Alemite Transfer Pump pays for itself by saving man-hours and machine-hours as well!

• A 400-pound barrel of lubricant arrives at the plant—sealed, fresh, "refinery clean."

• An Alemite Transfer Pump is inserted in the bung-hole. It is threaded to fit—completely reseals the barrel.

• In less than a minute a 25-pound bucket pump is filled! No contamination, no air pockets, no mess or waste!

• Now the bucket pump is ready to service hundreds of hungry bearings with lubricant that is protected all the way from barrel to bearing!

FREE! New Booklet:
"5 Plans for Better Lubrication"
Alemite, Dept. BB-36, 1850 Diversey Pkwy. Chicago 14, Illinois

Please send me my FREE copy of "5 Plans for Better Lubrication."

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

ALEMITE

Ask anyone in industry

A PRODUCT OF SW STEWART WARNER

If you're suffering from tired metals, weak metals, corroded metals—or some other costly metal ailment—it will pay you well to put in a call to a metals specialist today. May we suggest Riverside? Our metallurgists *are* specialists. And Riverside's experience in non-ferrous alloys spans more than a century. Experience, incidentally, that is yours for the asking.

THE RIVERSIDE METAL COMPANY DIVISION
H. K. PORTER COMPANY, INC.
Riverside, New Jersey
Philadelphia • East Orange, N. J. • Rochester, N. Y.
Hartford • Cleveland • Chicago • Detroit
RIVERSIDE HKP
PHOSPHOR BRONZE AND NICKEL SILVER SHEET, STRIP, WIRE AND ROD

LETTERS

(Concluded from page 10)

be many times a year. With a low investment in the first place, the returns even at 1.5 per cent on sales are likely to be satisfactory when stated as a return on investment.

L. S. Hamaker
General Manager of Sales
Republic Steel Corp.
Cleveland

Tool Measures Torque

I am interested in the torque screw drivers described in your article, "How Much Twist" (Jan. 30, page 95). Where should I write for descriptive literature?

C. W. Scott
Assistant Chief Inspector
Aircraft-Automotive Division
Combustion Corp.
Columbus, O.

• *Write: Apco Mossberg Co., 10 Lamb St., Attleboro, Mass.*

Rhapsody on Pollution

I saw the note, "Rhapsody on Pollution," in the Behind The Scenes column (page 6) in the Feb. 6 issue. I have had the same experience and agree with the engineer from Purdue. I would like a copy of the article. But, it is not a rhapsody. It is a waltz.

Frank W. Holtz
3735 Concord Ave.
Detroit

• *The article was written by Ralph A. Hoot, chief, Sewage Plant Section, City of Philadelphia. It is entitled "Industrial Waste Problems at Northeast in Philadelphia."*

Importance of Water

May I ask for reprints of the articles, "More Work for Water" (Jan. 30, page 84), and "Dollars Down the Drain" (Feb. 6, page 136)? As manufacturers of industrial cleaning and metal treating compounds, we can appreciate the importance of water to industry. You are to be congratulated for bringing this problem to your readers' attention.

A. T. Thibadeau
Public Relations
Oakite Products Inc.
New York

Plastic Is Not Melted

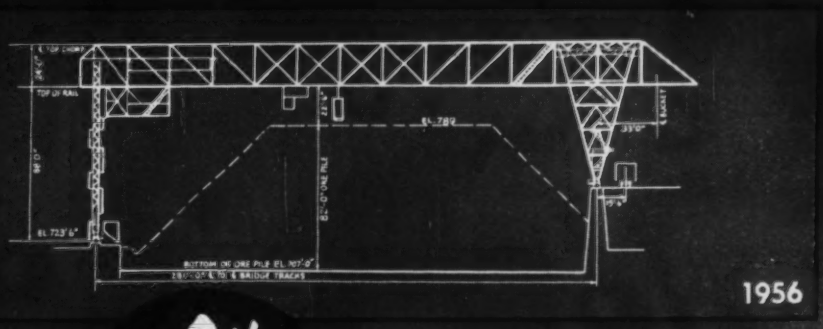
Your article, "Plastic Overcoats for Metal" (Feb. 20, page 114), stated that the parts are dipped into melted plastic.

Will you please inform your readers that the plastic is not melted in the Whirlclad tank. Preheated parts are dipped into plastic powder, then the powder melts onto the surface to form the coating. The powder is "dry fluidized" by currents of ascending gas or air, so that it will penetrate corners and crevices.

Conrad H. Busch
Advertising Manager
Polymer Processes Inc.
Reading, Pa.

UP GOES PRODUCTION AT WEIRTON STEEL COMPANY . . .

Division of National Steel Corporation



1956

and UP goes the 4th Heyl & Patterson Ore Bridge

3rd

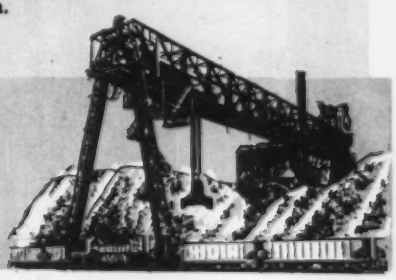
2nd 1942

1st 1926

Any equipment that contributes to increased production by National Steel's Weirton Steel Company division must be time-tested for dependable performance.

In 1926 (30 years ago) Heyl & Patterson built Ore Bridge No. 1 . . . in 1942 Ore Bridge No. 2 . . . in 1952 Ore Bridge No. 3. All three Ore Bridges are in successful operation. Now . . . Ore Bridge No. 4 is being built by Heyl & Patterson to accelerate the ever-mounting steel production records of Weirton Steel Company.

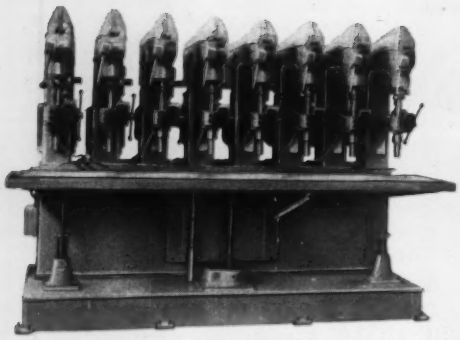
Wherever Ore and Coal Bridges are essential to consistent, time-tested production you can depend upon Heyl & Patterson Engineering, Fabricating, and Erection. Having an H & P Authority on Ore Bridges consult with you involves no obligation.



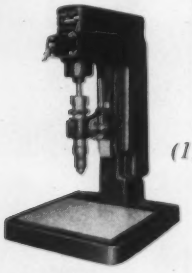
Heyl & Patterson INC.

55 FORT PITT BLVD. PITTSBURGH 22, PA. PHONE COurt 1-0750

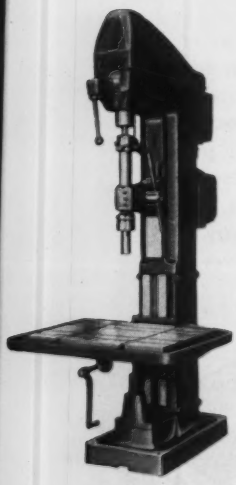
Avey has the right one



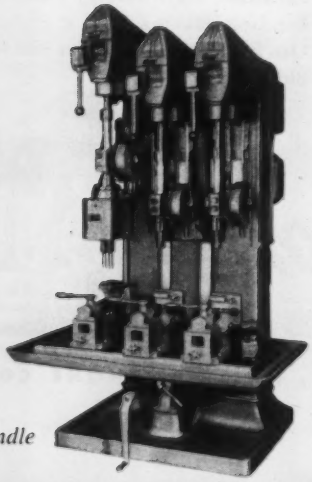
(7) Super 8 spindle



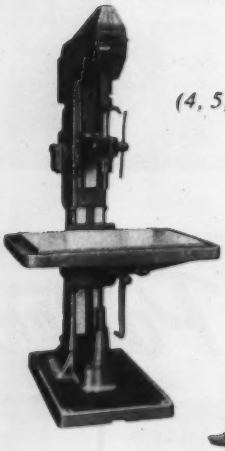
(1) Bench type

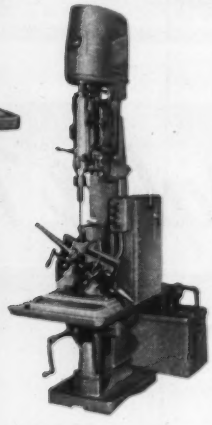


(2) Column type

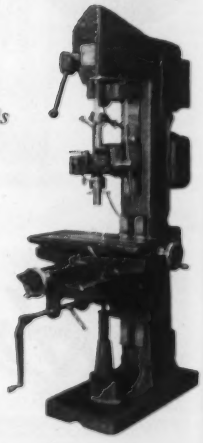


(3) Multi-spindle





(4, 5, 6) Tool room drills



Whatever your light and medium duty drilling needs, it's a sure bet that the machine you need is made by Avey. The whole Avey line would pack this magazine with pictures—would give you every combination of size, capacity, speed, overhang, and table arrangement to fit your requirements. The ones shown will give you the general idea. Write for literature.

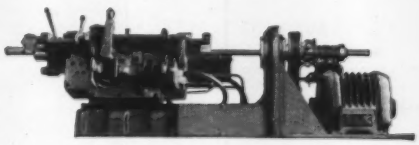
(Figures 1 through 6) Standard Drilling and Tapping Machines. Capacities in cast iron from very small numbered drills to 1½″; 6 or 8 speeds up to 12,000 rpm; No. 32 Jacobs chuck to No. 4 Morse taper; 4 feeds; 1 to 6 spindles; column or bench type; wide range of swing. Featuring such "bonus" advances as micrometer stop collar; telescoping spindle guard; dynamically balanced rotating parts; rack and pinion operated motor plate; large tool and die shop tables; and Avey's pace-setting spindle construction.

(4, 5, and 6) Avey tool room drills, built in No. 2 and No. 3 BMA-6 sizes. Large table 34″ x 25″; round table 18″ diameter; compound table 25″ x 12″.

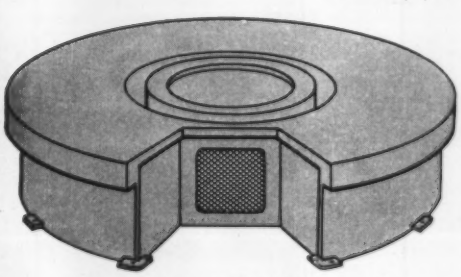
(7) Super 8 Spindle Drilling and Tapping Machine. No. 2 Morse taper. Power lift to table by push button control. Hand feed, power feed, lead screw tapping. Four feeds, 6 speeds. Built-in coolant system.

for Avey makes them all

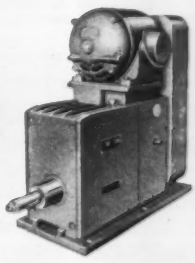
Avey



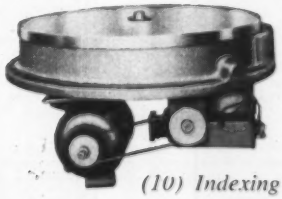
(9) Avey-draulic



(11) Standard base



(8) Cam feed unit



(10) Indexing table

(8) Automatic Cam Feed Units. For drilling, tapping, reaming, hollow milling. Vee belt or gear drive. Nos. 1, 2, and 3 Morse taper. Capacity in cast iron: No. 1, ½″; No. 2, 1″. Mount at any angle. Fully or semi-automatic. Self-contained, tamper-proof.

(9) Avey-draulic feed unit. Automatic withdrawal for chip removal only when necessary during deep hole drilling. Rapid advance, feed, and rapid return. Jump feed attachment available. Standard strokes 12″ up to 30″. Avey's patented Torque-matic control optional.

(10) Automatic index tables. Rapid, accurate indexing to .001″. Even or uneven index patterns obtainable. 16″ to 48″ diameter. All adaptable to Avey standard bases.

(11) Steel Bases. One of Avey's standard line of fabricated bases. Stress relieved, sandblasted, machined, and painted to fit your application. Combine 8, 9, 10, and 11, and you get fast returns on your investment, and a step ahead of your competition!

THE AVEY DRILLING MACHINE CO., CINCINNATI 1, OHIO

drilling, tapping, production machines

VOLUME makes the GEARS GO 'ROUND

F. W. Melter

MASTER MECHANIC, THE CINCINNATI GEAR CO.

Do you know what a small spiral bevel gear generator costs at today's prices? Approximately $35,000! And the cost of the work done by this machine represents on the average only about 15% of the total cost of producing a spiral bevel gear. Thus you can see it requires *volume* production and *maximum* utilization to make such expensive, specialized equipment pay off. And yet without such equipment, whether it be this spiral bevel gear generator or any one of the other pieces of capital equipment in our plant, it would be impossible to produce quality custom gears at a competitive price.

The sales and production departments have a big responsibility to keep these machines busy and earning their keep, but their efforts would be wasted if we didn't have the *right* tools in the first place. It is my job to see to it that we *have* these tools — that our plant is equipped with the most modern and efficient equipment available — through continuing re-evaluation of our present installations and constant searching for new and improved machines. When I can find equipment which would be superior to present equipment, I take the facts to top management. I've found in my 43 years' experience that in a progressive firm like ours these recommendations are usually acted on favorably — and promptly. That's how we manage to maintain a completely modern gear manufacturing plant, and thus produce progressively better gears more efficiently for you, our customer.

THE CINCINNATI GEAR CO.
CINCINNATI 27, OHIO
"Gears — Good Gears Only"

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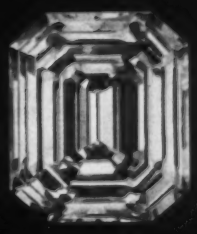
Here is perfection!

ROEBLING high carbon wire is unsurpassed for industry today. Roebling wire is absolutely true to specifications ...absolutely uniform in gauge and finish. Manufacturers who try Roebling wire once, become Roebling customers from then on.

You *pay* for the best when you buy high carbon wire. Make sure that you *get* it! Always specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.



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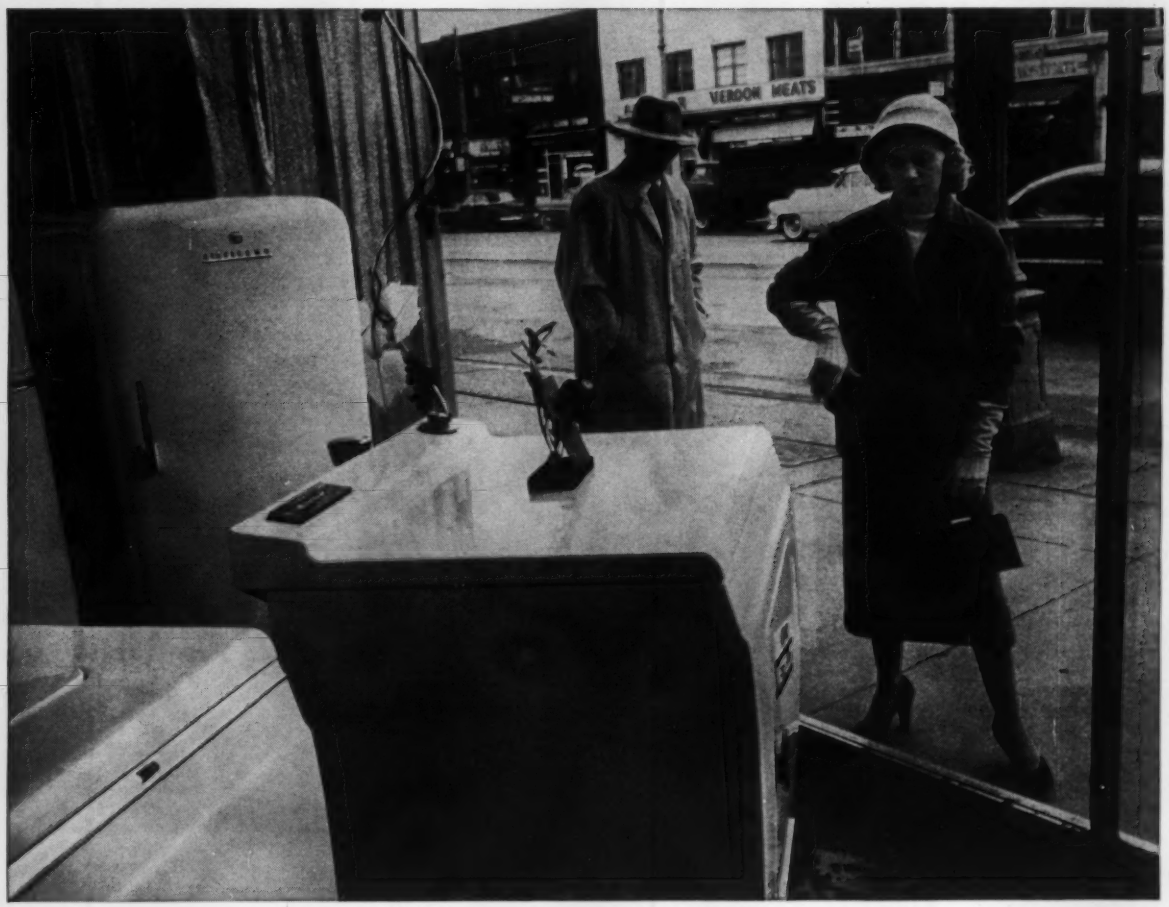


When you've got your eye on the one who will buy, *you use Bonderite under the paint*

PROTECTED BY Bonderite PARKER RUST PROOF CO. QUALITY CORROSION RESISTANT

BUY-SIGN for people looking for lasting finish..:

Bonderite seals, furnished free to Bonderite users, promise "This product will look better longer." Six million will be used this year. Write for information on Bonderite seals for *your* product.

● There are lots of reasons for preferring Parker's corrosion resistant paint base, Bonderite: dependability, over-all economy, quality of product, results and service.

There's another advantage that's *exclusively* Bonderite's: Only Bonderite is known to *your* customer, the ultimate consumer. A quarter of a century of national advertising has established a cause-and-effect relationship between Bonderite-protection and a product that looks better longer.

Yes, when you've got your eye on the one who will buy, you use Bonderite under the paint—and use it to help you make sales.

**Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U. S. Pat. Off.*

PARKER RUST PROOF COMPANY
2158 E. MILWAUKEE, DETROIT 11, MICHIGAN

Since 1915—leader in the field

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

This steel helps a hammer keep its head

It's an Estwing* solid steel unbreakable hammer. Made in one piece. Made of Youngstown high carbon manganese steel.

This steel must be strong and tough. It must possess the necessary qualities for forging, hardening and tempering. Because Youngstown has been furnishing it to accurate specifications for the last 14 years, Estwing's forging and heat treating operations have been fast and accurate.

Result: Costly rejections have been eliminated.
Employees find it easier to work.
Consumers get the world's only one-piece hammer.

By furnishing steel with the exact analysis, Youngstown has helped Estwing to effect substantial savings. Perhaps we can do the same for you. All it takes to find out is a phone call to any one of Youngstown's 28 district sales offices. Why not do it—today? It may save you a lot—tomorrow.

*Manufactured by Estwing Mfg. Co., Rockford, Ill.

Youngstown QUALITY STEEL

THE YOUNGSTOWN SHEET AND TUBE COMPANY Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

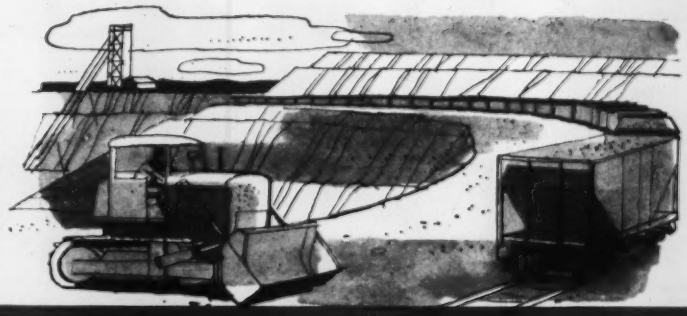
SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

From Mine to Mill.

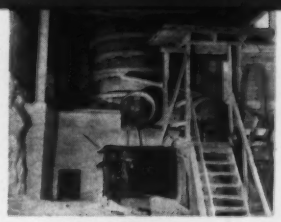
Allis-Chalmers Equipment serves in every part of the Steel Industry... Dependably, Economically

For more than three quarters of a century, Allis-Chalmers has served the steel industry — supplying the equipment needed to produce top quality steel... the manufacturing "know-how" to meet heavy-duty operating conditions... the pioneering spirit to keep up with the changing requirements of the industry. Allis-Chalmers machines are employed, not just in one phase, but all through the steel-making process. For complete information on how Allis-Chalmers can help solve your machinery problems, consult your Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.

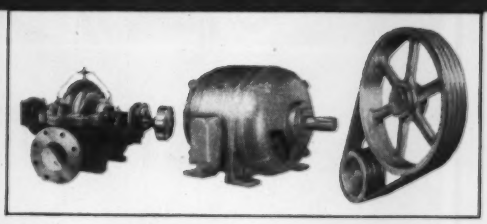
Regulex and *Texrope* are Allis-Chalmers trademarks.



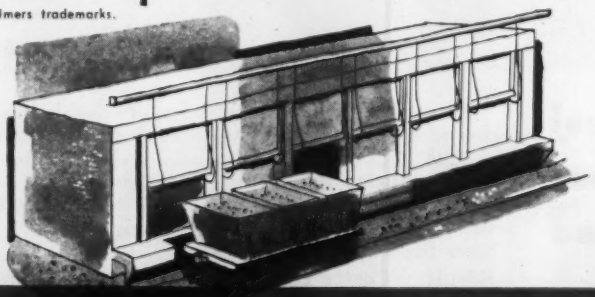
MINES...

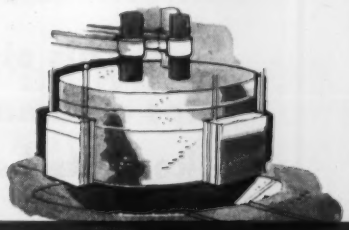


Crushers, grinding mills, vibrating screens engineered and manufactured by Allis-Chalmers crush the ore-bearing rock, grind it to specified size, size and wash metallic ores, stone and coal.

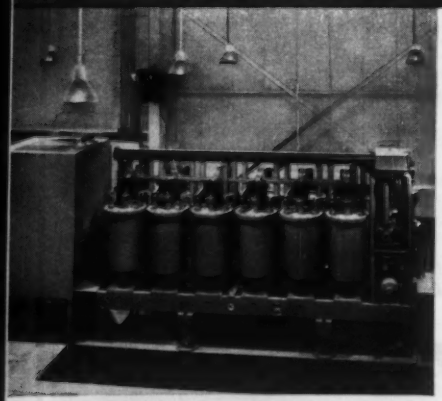


Allis-Chalmers pumps, motors, *Texrope* drives are in wide use throughout the metal industry because of their long life characteristics, low maintenance requirements and great versatility.

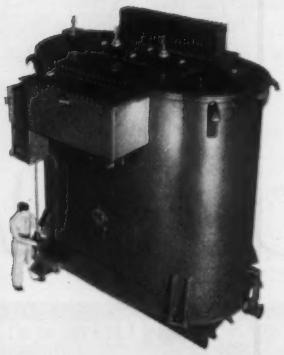




OPEN HEARTH... ELECTRIC FURNACE...

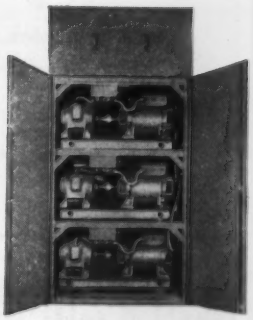


Mercury-arc rectifiers furnish constant voltage dc power for material handling in open hearth and other mill operations and for mine haulage. Variable voltage units are supplied for supporting main roll drives.



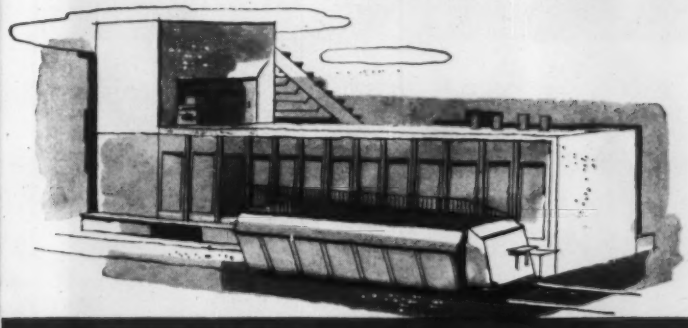
Allis-Chalmers arc furnace transformers are of well-balanced design and extra heavy duty construction — proven in 25-30 years of repeated daily short-circuits in electric furnace operation.

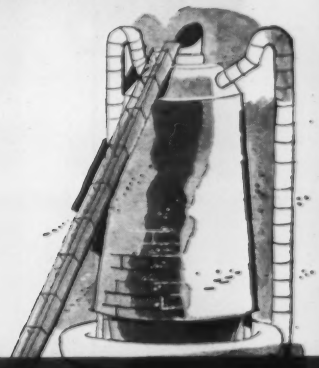
***Regulex* control** balances arc current with arc voltage, almost instantly — maintains desired arc condition automatically.



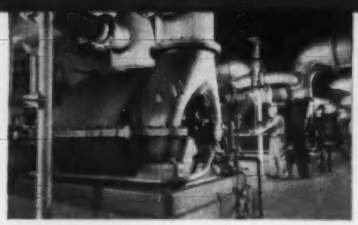
ALLIS-

. . It's Allis-Chalmers



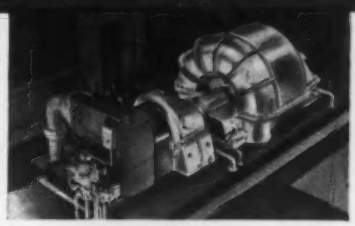


COKE OVEN...

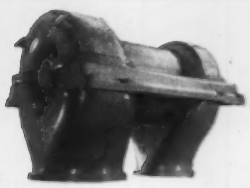


Booster, exhauster or combination service requirements are met by Allis-Chalmers blowers. Photo shows four 23,000-cfm, 5100-rpm, 3.5-psig centrifugal exhausting blowers in a western steel mill.

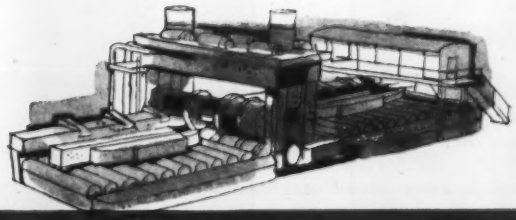
BLAST FURNACE...

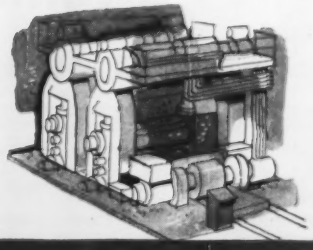


Blast furnace blowers furnished by Allis-Chalmers meet blast furnace requirements. The 75,000-cfm, 30-psig centrifugal blower shown here has been in service since 1942. It is driven by an 8500-hp steam turbine.



Allis-Chalmers axial blowers are designed for high efficiency blast furnace duty. They are smaller, easier to install — save $50,000 or more in steam per year. A-C also builds constant efficiency rotary compressors.





BLOOMING MILL...

Motor room photograph shows Allis-Chalmers switchgear, control, constant and variable voltage motor-generator sets, *Regulex* m-g sets, liquid rheostat, and twin-drive motors in use in a midwestern steel plant.

FINISHING MILLS...

Hot strip, cold reduction, temper, rod and wire mills, and annealing and pickling lines employ Allis-Chalmers control, power equipment and drive motors for dependable operation.

Other Equipment

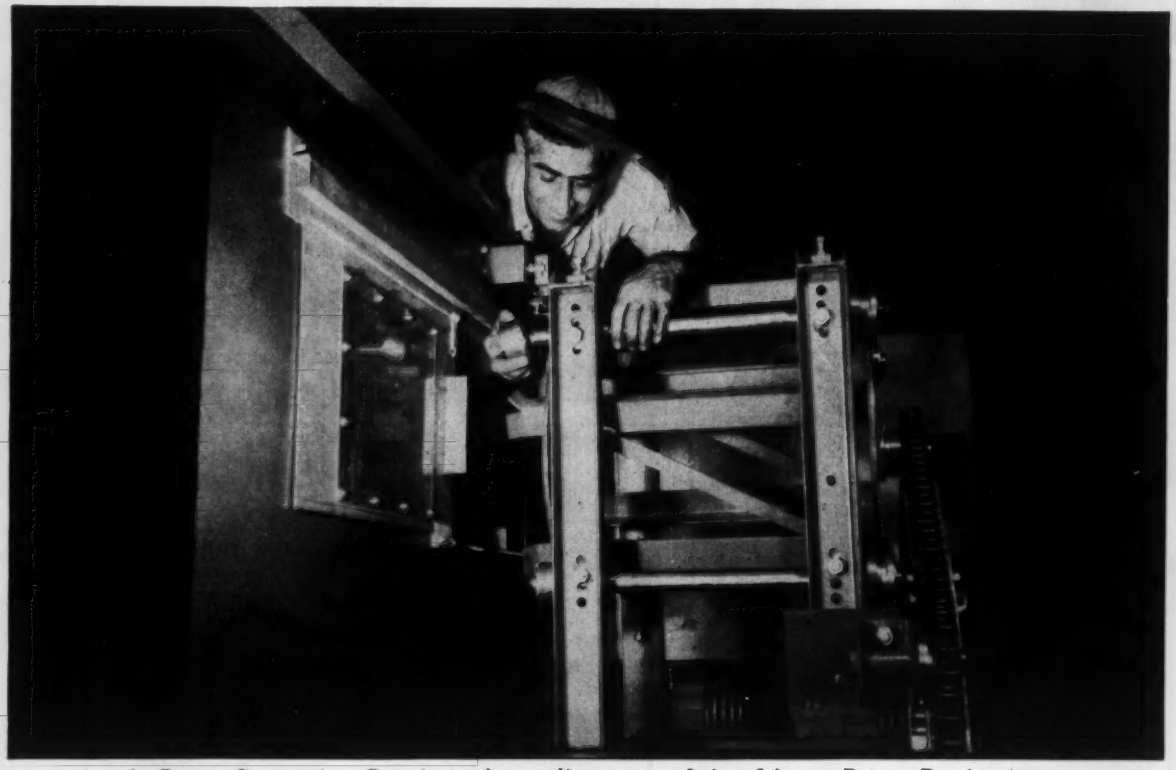
Besides the power utilization and conversion equipment illustrated, Allis-Chalmers also supplies power generation and distribution requirements from mine to mill.

For power generation, A-C builds steam turbine-generator units, surface condensers, water conditioning equipment, pumps, motors, and control. Also hydraulic turbines, generators, governors, and valves. For power distribution, A-C furnishes transformers, voltage regulators, circuit breakers, switchgear, and substations.

Throughout this wide range of products, you can depend on Allis-Chalmers for equipment engineered to meet your exact needs.

CHALMERS

A-4907



At Detrex Corporation, Detroit, workman slips a snug fitting Johnson Bronze Bearing into place on the shaft of an idler arm of this compact Rotary Gyro Degreaser. Idler arms move in "ferris wheel" motion to rotate heavy baskets filled with parts to be degreased.

How Detrex Prevents A Maintenance Problem With Johnson Bearings

The Detrex Corporation, Detroit, manufactures a full line of unique, automatic degreasers, washers, drycleaning and other equipment to speed production, save time and money for many industries where removing oil and grease from parts and materials is a problem.

On the idlers of the totally enclosed Rotary Gyro Degreaser shown being assembled above, Johnson Bronze General Purpose Bearings give years of trouble-free service.

As a Detrex executive puts it: "When we sell a machine we want the customer to forget about shut-downs to repair some trivial part that's failed, so we design every part, choose every piece of material with one thought in mind: make it better to last longer. It's the reason we have specified Johnson Bronze General Purpose Bearings wherever bearings of this type will do the job."

Detrex depends upon a Johnson distributor in that area for service on their bearing requirements. They have found his stocks to be adequate to meet their requirements and know that even in emergencies the bearings they need will be delivered when they want them.

Johnson General Purpose Bearings are available from stock in over 900 sizes. Alterations such as oil grooves, slots, or holes are easily and quickly made. They are cast in Johnson's famous, high grade bearing bronze alloy No. 72. For complete information on prices and delivery, call your Johnson distributor. Johnson Bronze Co., 550 South Mill Street, New Castle, Pa.

Johnson Bearings

GRAPHITED
over 175 sizes

GENERAL PURPOSE
over 900 sizes

UNIVERSAL BRONZE BARS
over 400 sizes

LEDALOYL
over 400 sizes

ELECTRIC MOTOR
over 350 sizes

Multiple sources for "Things" not called SPRINGS

Yours to put to work . . . . our mechanical ingenuity and craftmanship . . . . experienced in producing an infinite variety of metal parts in such fields as automation, communication, medical, electronics, safety devices, product development, etc. The capacity of ASC springmaking minds and machines is unlimited. Ask any Division to examine your sample or blueprint.

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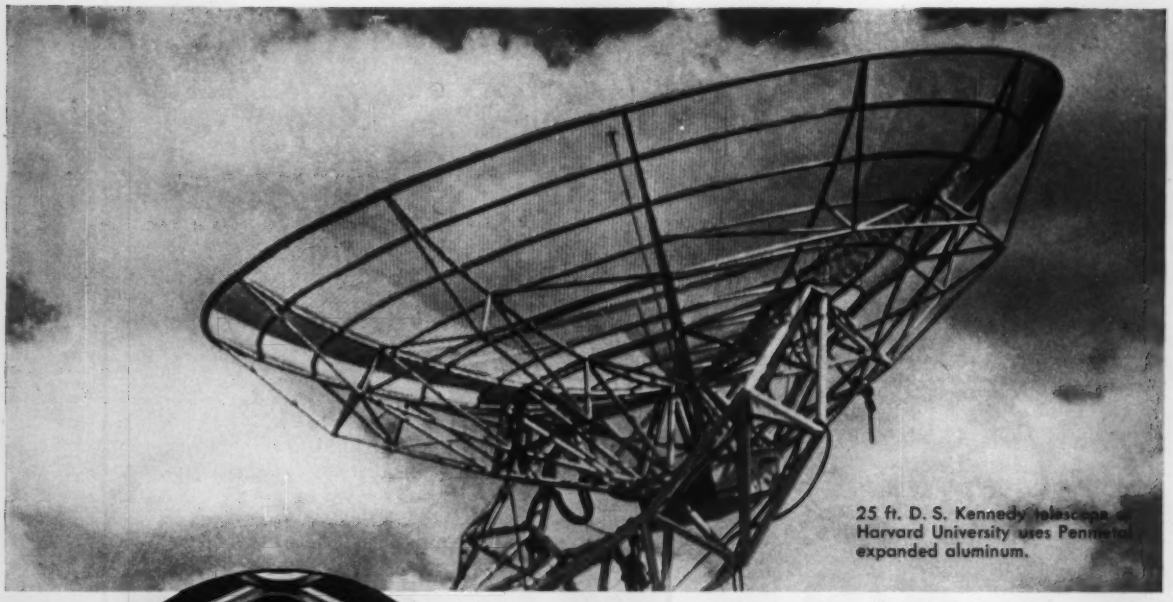
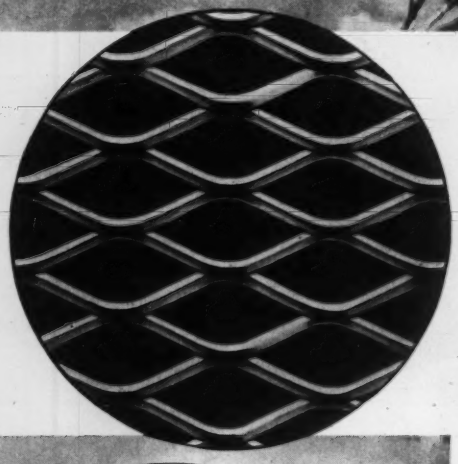
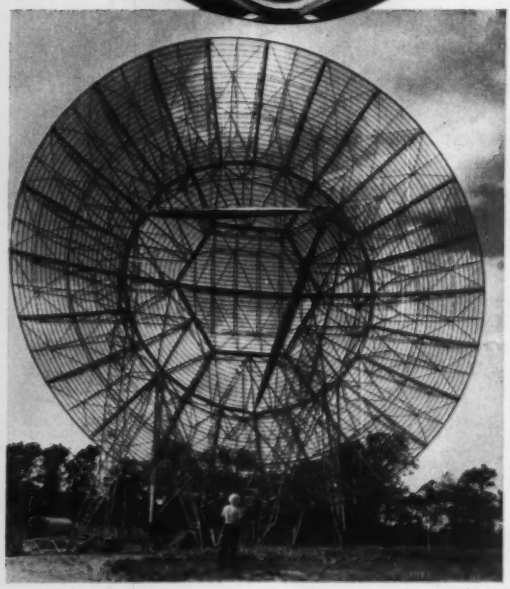
- RAYMOND Manufacturing COMPANY, CORRY, PENNSYLVANIA
- BARNES-GIBSON-RAYMOND, 40300 PLYMOUTH RD., PLYMOUTH, MICH.
- B-G-R COOK PLANT, ANN ARBOR, MICHIGAN
- SEABOARD Coil Spring Div., 19001 S. BROADWAY, GARDENA, CALIF.
- OHIO DIVISION, 1825 EAST FIRST ST., DAYTON, OHIO
- WALLACE BARNES COMPANY, STATE FAIR BLVD., SYRACUSE 9 (Salina), N.Y.
- MILWAUKEE DIVISION, 341 E. ERIE ST., MILWAUKEE, WIS.
- DUNBAR BROTHERS COMPANY, BRISTOL, CONN.
- F. N. MANROSS AND SONS CO., BRISTOL, CONNECTICUT
- THE WALLACE BARNES CO., LTD., HAMILTON, CANADA

Divisions of **ASSOCIATED SPRING CORPORATION**



25 ft. D. S. Kennedy telescope at Harvard University uses Penmetal expanded aluminum.





Penmetal expanded aluminum covers entire area of 60 ft. Trans-Horizon antenna.

Why D. S. Kennedy & Co. prefers expanded aluminum for Radar Antennas

Over the past five years Penmetal has supplied a great deal of expanded aluminum to leading manufacturers of microwave and radar antennas. An example is D. S. Kennedy and Company of Cohasset, Mass.—many of whose developments have become standard specifications in the industry. They use Penmetal expanded aluminum to cover the entire area within the outer periphery of their antennas. Reasons:

- **EXTREME LIGHTNESS**—large areas can be covered with a minimum of weight.
- **MAXIMUM OPEN AREA**—for minimum wind resistance.
- **CORROSION-RESISTANT**—for long life under all weather conditions.
- **LOW COST**—large areas can be covered economically.
- **EASILY FABRICATED**—with standard tools.

As we have done with D. S. Kennedy & Co., Penn Metal will work closely with your engineers in producing special-purpose meshes for your requirements.

Best way to success when you make radar and microwave antennas is Penmetal expanded aluminum. Write for free folder which describes this material in detail.

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Plant: Parkersburg, W. Va.

District Sales Offices: Boston, New York, Philadelphia, Chicago, Detroit, Dallas, Seattle, San Francisco, Los Angeles, St. Louis, Parkersburg

Penmetal

PM-96

CALENDAR
OF MEETINGS

Mar. 19-20, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland, O. Executive vice president: F. Kermit Donaldson.

Mar. 19-21, American Society of Mechanical Engineers: Spring meeting, Multnomah hotel, Portland, Oreg. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 19-21, Society of Automotive Engineers Inc.: National Production meeting and forum, Hotel Statler, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 19-23, American Society of Tool Engineers: Industrial exposition and annual convention, International Amphitheatre and Conrad Hilton hotel, Chicago. Society's address: 10700 Puritan Ave., Detroit, Mich. Executive secretary: Harry E. Conrad.

Mar. 22-23, American Hot Dip Galvanizers Association: Annual meeting, Drake hotel, Chicago. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Mar. 26-28, American Management Association: Special conference on reducing manufacturing costs, Hotel Statler, Detroit. Association's address: 1515 Broadway, New York 36, N. Y. Vice president-secretary: James O. Rice.

Apr. 1-5, American Society of Mechanical Engineers: Oil and gas power conference, Jung hotel, New Orleans. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 4-6, American Institute of Steel Construction Inc.: Spring meeting and national engineering conference, Lehigh University, Bethlehem, Pa. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

Apr. 4-6, American Society of Lubrication Engineers: Annual meeting and exhibit, William Penn hotel, Pittsburgh. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: William P. Youngclaus Jr.

Apr. 4-6, Rail Steel Bar Association: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 4-7, National Screw Machine Products Association: Annual meeting, Schroeder hotel, Milwaukee. Association's address: 2860 E. 130th St., Cleveland 20, O. Executive vice president: Orrin B. Werntz.

Apr. 8, Packaging Machinery Manufacturers Institute: Spring meeting, Dennis hotel, Atlantic City, N. J. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: R. L. Sears.

Apr. 8-12, Scientific Apparatus Makers Association: Annual meeting, Belleview-Biltmore hotel, Belleair, Fla. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Apr. 9-11, American Institute of Mining & Metallurgical Engineers: Meeting of National Open-Hearth, National Blast Furnace, Coke Ovens and Raw Materials Committees. Netherland Plaza hotel, Cincinnati. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Apr. 9-12, American Management Association: Packaging conference, Convention Hall, Atlantic City, N. J. Association's address: 1515 Broadway, New York 36, N. Y. Vice president-secretary: James O. Rice.

Apr. 9-12, Society of Automotive Engineers Inc.: National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Apr. 10-11, American Society of Mechanical Engineers: Machine design conference, Bancroft hotel, Worcester, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

when your cranes and hoists are powered by...

FEEDRAIL® Trolley Busways

PICTURED ABOVE . . . View of FEEDRAIL*-powered bridge crane and hoist at receiving department in the plant of a leading automotive manufacturer. By means of a system of interlocking bridges, runways and monorails, materials can be transported to and from any point in the building — with* FEEDRAIL'S *trolley outlets traveling right along, providing* SAFE, *uninterrupted power.*

CH4-1 Rev.

There are no time-consuming, costly traffic hold-ups when shipping and receiving department cranes and hoists are powered by FEEDRAIL Trolley Busways. FEEDRAIL's expertly engineered design makes it a completely safe, trouble-free system of electric power distribution.

What's more—it's *adaptable*—first, because practically any place a crane or hoist can go in receiving, production, staging and shipping areas, FEEDRAIL will go—and, second, because an installation can be readily modified or expanded to meet the needs of changing requirements.

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Subsidiary of Russell & Stoll Company, Inc.
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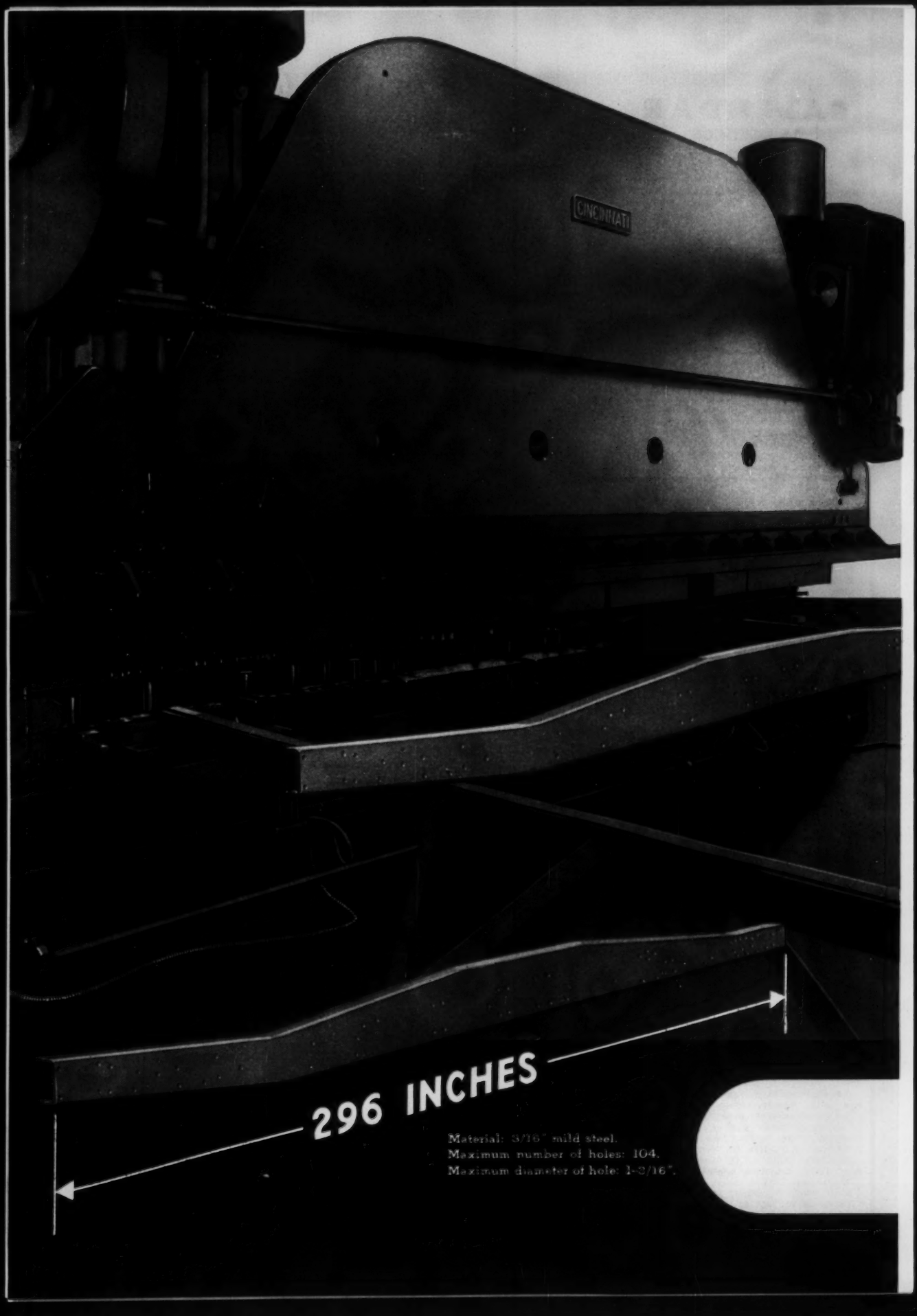

Material: 3/16" mild steel.
Maximum number of holes: 104.
Maximum diameter of hole: 1-3/16".

PUNCHING

104 holes every 10 seconds *accurately*

The multiple punching of these holes must be very rapid, and their location as well as spacing must be held accurately.

The assembly of these 24' trailer frames is smooth and economical with no costly hand fitting.

With this punching equipment, position, size and spacing of holes may be changed quickly and at low cost.

The Brake can perform many other operations as desired . . . converting from one operation to another quickly and at low cost.

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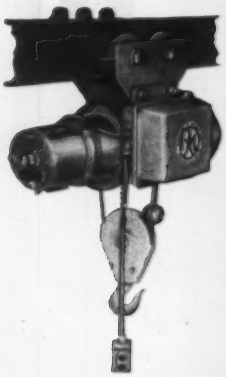
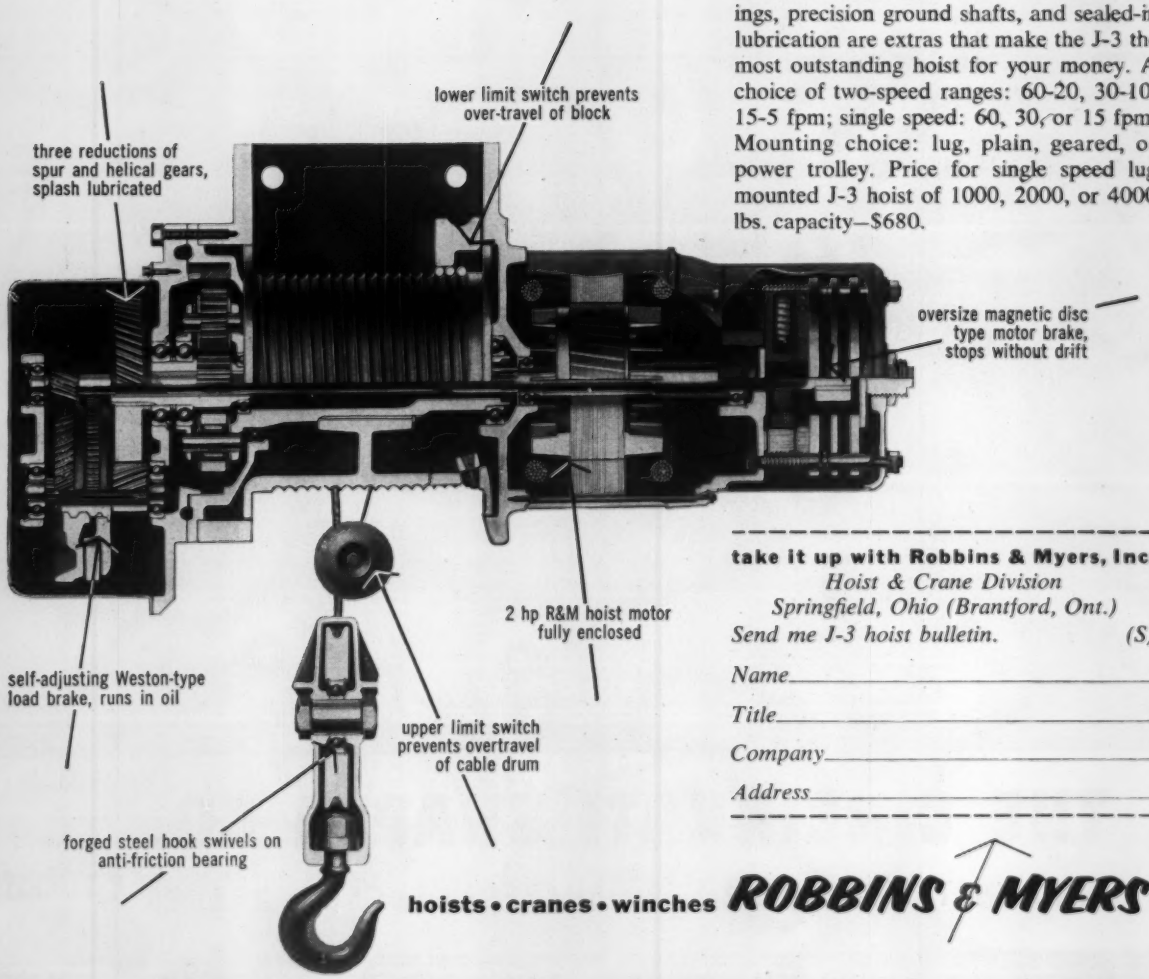


too much hoist?

R&M J-3 hoists have specific points of superiority that go beyond what hoist users usually consider "adequate." The 2 hp R&M high torque hoist motor, designed and built for full-time, full-load hoist duty, has the highest motor rating found in any standard hoist (30 min., 55 degrees C.), giving it ample reserve for accidental overloads. Power is transmitted through three reductions of cut helical and spur gears, instead of the usual two. Oversize ball bearings, precision ground shafts, and sealed-in lubrication are extras that make the J-3 the most outstanding hoist for your money. A choice of two-speed ranges: 60-20, 30-10, 15-5 fpm; single speed: 60, 30, or 15 fpm. Mounting choice: lug, plain, geared, or power trolley. Price for single speed lug mounted J-3 hoist of 1000, 2000, or 4000 lbs. capacity—$680.


lower limit switch prevents over-travel of block
three reductions of spur and helical gears, splash lubricated
oversize magnetic disc type motor brake, stops without drift
2 hp R&M hoist motor fully enclosed
self-adjusting Weston-type load brake, runs in oil
upper limit switch prevents overtravel of cable drum
forged steel hook swivels on anti-friction bearing

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RED STREAK FLANGES

Strong, high-speed resinoid bonded wheels with built in circular steel flanges. Exceptional for fast stock removal, long wheel life and extra protection against radial cracking. Easy to mount. Accurate balance, true running for superior grinding action. In 6″, 10″ and 12″ hole sizes. Send for bulletin ESA—62.

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carries 35% extra

The roof, roof bows, side walls, side rails, reinforcements and doors of the new Volume Van are fabricated from high tensile strength stainless steel. The Van is 35′ long, 11′ high and utilizes 94″ of space out of a possible 96″ of legal outside width. Inside length is only 4½″ less than the overall length. The "Shotweld" process of construction, developed and employed by The Budd Company in producing panels, etc., fuses the entire stainless steel structure into one integral unit.

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World's Widest Range of Standard Steels

OF THE OPEN ROAD

payload in lightweight armor

of STAINLESS STEEL

It's the Fruehauf Trailer Company's new Stainless Steel Volume Van.

Stainless steel trailer construction is not new in itself. Stainless steel trailers have been used for years by both large and small fleet operators for transporting milk, meat, produce and frozen foods. They have found that the corrosion-resistant and sanitary qualities of stainless steel cannot be matched for use in refrigerated trailers.

Stainless steel trailers are also at the top of the list for carriers of salts, acids and other chemicals that attack other metals used in trailer construction.

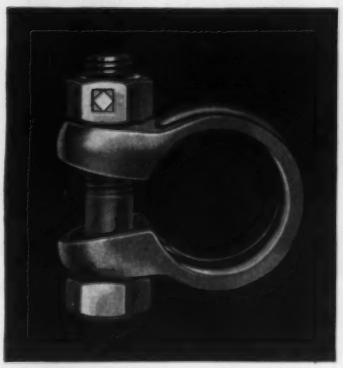
Stainless steel's exceptionally high strength-to-weight ratio has made it possible to design this completely new trailer with 35% extra payload capacity.

Stainless steel construction permits the use of thinner, lighter sections—without loss of strength, without sacrifice in safety. Yet with long life assured at the lowest ultimate cost.

Republic—maker of ENDURO Stainless Steel and world's largest producer of alloy and stainless steels—is proud of its contribution to the new Volume Van. And we offer you the services and knowledge of our metallurgical and engineering departments in helping you use stainless steel to give your product strength without added weight or make it look better and last longer.

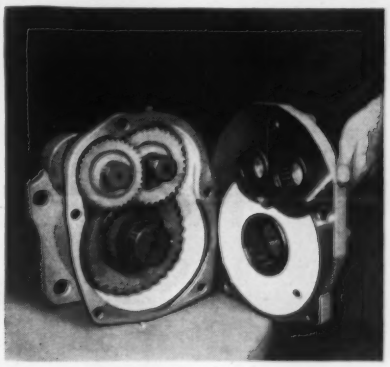
Just send us the coupon for more information.

Here are two more Republic products with advantages for equipment builders



NEW USES FOR REPUBLIC NYLOK NUTS are constantly being developed. In this tie-rod clamp assembly they provide positive locking and ease of adjustment. They are ideally suited for mechanical feeding and power wrenching because either end is up. Republic Nylok Nuts lock whether seated or not. Cut maintenance costs, too. They can be backed off for parts inspection or adjustment and then can be re-used.

EXTRA STRENGTH WITHOUT EXCESS WEIGHT is built into parts when you design with Republic Alloy Steels. These fine steels provide an outstanding combination of qualities essential to safety in designing equipment to carry heavier loads at higher speeds. Alloy steels lengthen service life in transmissions, bearing, shafts, axles, etc. Republic metallurgists are available to help you use these steels to the best advantage in your product.



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☐ Nylok* Nuts ☐ Alloy Steels

* U. S. Pat. No. 2,450,694 and pending applications.

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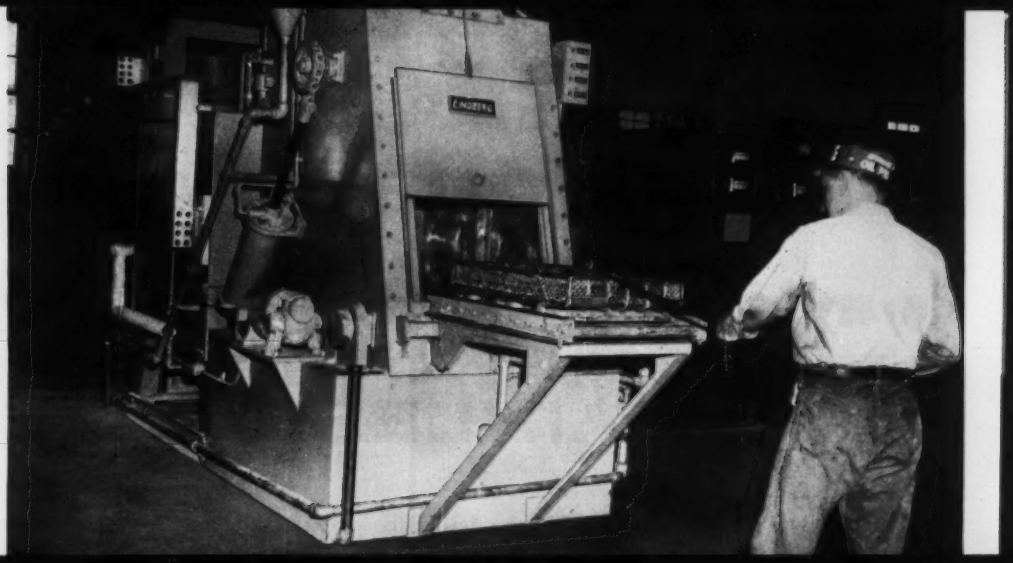
New Lindberg electric furnace with CORRTHERM element at Allied Metal Treating Corporation, Kenosha, Wisconsin. This furnace is used 24 hours a day, 6 days a week, for carbonitriding, clean hardening pinion gears, hardening crank shafts after carburizing and carburizing small gears and shafts.



EKLUND

Installation of new Lindberg furnace with CORRTHERM electric element at Eklund Metal Treating, Inc., Rockford, Illinois. Furnace used 24 hours a day, 7 days a week, for carburizing gears and machine tool parts, carbonitriding sheet metal screws and automotive parts, and hardening and tempering bolts.

PERFECTION

Lindberg electric furnace with CORRTHERM element just installed at Perfection Tool & Metal Heat Treating Company's Lombard, Illinois plant. This furnace is being used 24 hours a day, 6 days a week, for carbonitriding and carburizing parts for automotive and farm implement industries.

COMMERCIAL HEAT-TREATERS QUICK TO ADOPT LINDBERG ELECTRIC CARBONITRIDING FURNACES WITH NEW CORRTHERM HEATING ELEMENT

It is significant that commercial heat-treaters, always in the lead in the acceptance and development of better heat-treating methods, have been among the first to appreciate the revolutionary advantages of Lindberg's newly announced CORRTHERM electric heating element.

Recent Lindberg CORRTHERM-equipped furnace installations in plants of three leading midwestern commercial heat-treaters are shown on the opposite page.

Where electricity is the preferred source of heat Lindberg furnaces with CORRTHERM provide to the fullest degree the versatility and dependability required in efficient commercial heat-treating. Ideal for carbonitriding, they are readily applicable to other processes—carburizing, carbon restoration, bright hardening or annealing, and normalizing.

Whether your heat-treating operations are commercial or captive, large or small, the CORRTHERM element in Lindberg electric furnaces offers you these exclusive advantages:

Low voltage—operates at extremely low voltage. No leakage through carbon saturation.

Atmosphere Circulation—elements act as baffle to direct circulation of convection streams.

Safety—extremely low voltage eliminates shock or short hazards.

Durability—watts density at all time low. Element practically indestructible.

This shows how the new Lindberg CORRTHERM electric heating element fills the furnace with walls of glowing heat. Note also that CORRTHERM is conveniently hung from simple brackets requiring no complicated connections or construction.

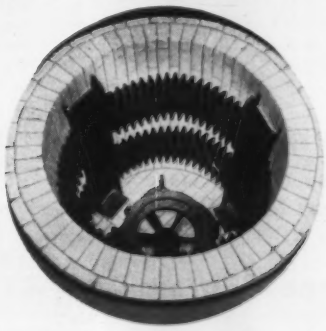
CORRTHERM is an exclusive Lindberg development created in Lindberg laboratories by Lindberg metallurgists and engineers. To find out how its advantages can be applied to your heat-treating processes consult your nearest Lindberg Field Representative. (Look in classified phone book.)

LINDBERG ENGINEERING COMPANY

2441 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 Regentview Ave., at Downey, California

Installation of CORRTHERM elements in one of two large rotary furnaces just erected in the field by Lindberg's associate company, Lindberg Industrial Corporation.



Installation of Lindberg CORRTHERM-equipped carburizing pit-type furnace in plant of Lindberg Steel Treating Co., Melrose Park, Ill.

Safety! Extremely low voltage makes CORRTHERM elements completely safe. Let operator or work load bang it if they will. Neither element nor operator will be hurt.

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. . . products that have the high-standard qualities you look for

Responsible manufacturers appreciate the *economy* of using the *best* in their assemblies—including fasteners.

Cleveland Quality starts with steel selection—making sure of approved analysis. Then Cleveland production control insists upon accurate forming to close tolerances; clean threads—accurately concentric, with uniform lead on threads; and machine-cut points. On hex head screws it's important that heads have sharp corners on the sides and a good washer face under the head. Heat treating must be *right*, where it applies; and good appearance in general is desirable—to help dress the finished assembly.

All these factors are carefully checked at Cleveland, where *extra strength* is added, too, through application of the Kaufman *Double Extrusion* Process . . . Notice the wide range of sizes in the list below. Specify Cleveland Fasteners at your jobbers, or write us for catalog.

Ferrous and Non-Ferrous:
Bright, High Carbon and Alloy Steel Heat Treated, Brass, Silicon Bronze, Stainless Steel

Hex Head Cap Screws—¼″ to 2½″ dia.
Socket Head Cap and Set Screws—Plain and Knurled: ¼″ to 1½″ dia. Also Flat and Button Head Styles
Flat Head Cap Screws—¼″ to 1″ dia.
Fillister Head—¼″ to 1″ dia.
Set Screws—Square Head—¼″ to 1½″ dia.
Milled Studs—¼″ to 1½″ dia.
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Originators of the Kaufman DOUBLE EXTRUSION Process

How New Chromium plating process solves problems for two companies

♦ **"Crack-Free" Chromium gives washing machine shafts solid protection from rust**

♦ **Manufacturer eliminates undercoats for die cast hardware with new Unichrome process**

Unichrome Crack-Free Chromium Plating is proving superior to ordinary chromium in certain types of applications . . . especially where durability and protection are at stake.

PROVES IDEAL IN WASHING MACHINE

Steel drive shafts in well known washing machines are now plated directly with Crack-Free Chromium about .0005" thick. Unlike *ordinary* chromium, this deposit has no microscopic cracks to admit water, humidity, soap and detergent spillage. Shafts stay rust-free, and get extra wear-resistance besides.

ONE-STEP PLATING OPERATION

Chromium was the finish wanted for new line of zinc die cast cabinet hardware. Also wanted was a process that would permit the company to get into immediate production with an existing tank. Unichrome Crack-Free Chromium satisfied both needs. The company now plates directly on the castings, eliminating copper and nickel plating stages, extra handling, and need for major new equipment. The matte gray finish is buffed up readily to high lustre.

This is just one of many Unichrome developments in processes, equipment and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.

PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
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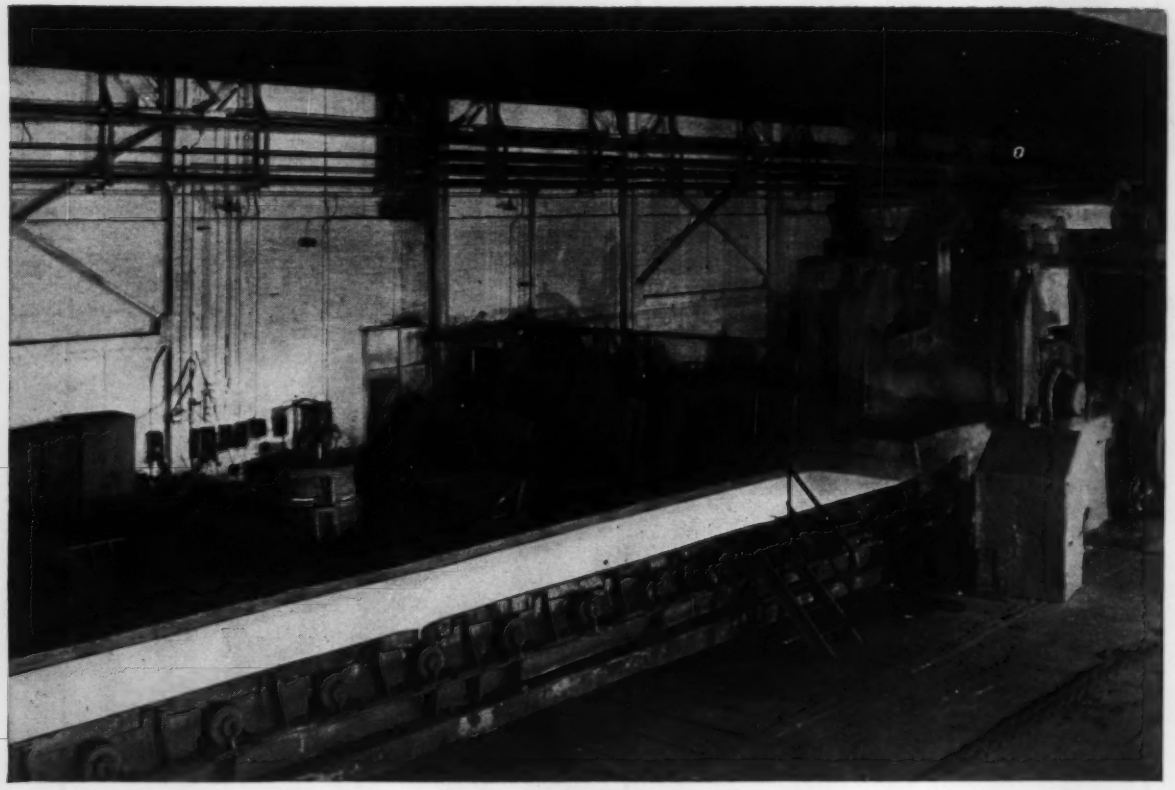


Gears & Bearings: Extra protection for

The enclosed gears that drive your rolls will run more smoothly, last longer and cost less for maintenance when lubricated with *Texaco Meropa Lubricant*. Ask the mill that uses it.

Texaco Meropa Lubricant contains polar additives that give it ability to cling to metal under the most adverse conditions. This, combined with long-lasting EP properties, enables *Texaco Meropa Lubricant* to give extra protection—far in excess of normal requirements.

In addition, *Texaco Meropa Lubricant* resists the thickening that is normal with many lubricants. It does not foam, will not separate, will not corrode gears or bearings.

A Texaco Lubrication Engineer will gladly give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Meropa Lubricants

FOR STEEL MILL GEAR DRIVES

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

Where Diversification Helps

Benefits of diversification may sustain the auto parts industry. *Value Line Investment Survey* estimates that car production in 1956 will slip to 6.8 million units, 15 per cent below the record 1955 level. But few parts makers will suffer declines of corresponding severity in sales or profits because other important sources of revenue will cushion the effect of reduced demand for original automotive equipment. Such sources include construction machinery, building, hardware, heavy truck, aircraft, foundry, railroad and farm equipment lines, in addition to the replacement needs for auto parts themselves.

A Bellwether Does Well

Watch screw machine products. Activity in this bellwether line can presage general economic conditions some months hence. New orders and shipments for screw machine parts in January were up slightly—the former up 1 per cent over December and 10 per cent over January, 1955; the latter up 8 per cent over December and 22 per cent over the previous January.

Electronics on the Move

Radio Corp. of America's Frank M. Folsom looks for electronics volume to hit $18 billion by 1964, compared with nearly $11 billion in 1955. He sees much of that gain coming from major expansion in color television.

GE Looks Ahead

By 1966, General Electric Co. employees may be earning an average of $8000 to $9000 a year. GE President Ralph J. Cordiner believes that will be possible because of a greatly expanded national economy in which the ratio of skilled to unskilled jobs is certain to rise. Average annual earnings of GE employees, including benefits paid by the company, have increased from slightly more than $2000 in 1939 to about $5600 in 1955. Mr. Cordiner estimates that "in the early 1960s production of 10 million cars a year can well be the way of life in the automotive industry." He indicates that "in another decade our housing needs may call for 2 million new homes or dwelling units a year."

Look Before You Leap

Professional employees who want to unionize, but in a broad labor unit, had better look before they leap. The National Labor Relations Board has just ruled that professional employees have no right to a decertification election to withdraw from a plant-wide union which they once voted to join, even though the early vote was years ago and there has been sub-

stantial turnover since. The board made that decision in rejecting a decertification petition filed by professional engineers seeking to leave the AFL-CIO electrical workers at a Westinghouse plant in Jersey City. The board, however, extends to professionals the doctrine that they may withdraw from a unit and go nonunion. Craft and technical people are denied that right.

Labor Power for States?

The Supreme Court of Missouri has dismissed an employer's petition for an injunction against coercive organizational picketing which violated the state constitution and statutes. The reason: The court evidently is convinced that decisions of the U.S. Supreme Court leave the states without power to deal with any labor matters subject to federal acts. Under the present decision, state courts apparently would have no power except to stop mass picketing, violence and other conduct which threatens the public peace and order. But even this authority is under attack by unions in the Kohler case now pending in the U.S. Supreme Court.

U.S. Steel and Tidewater

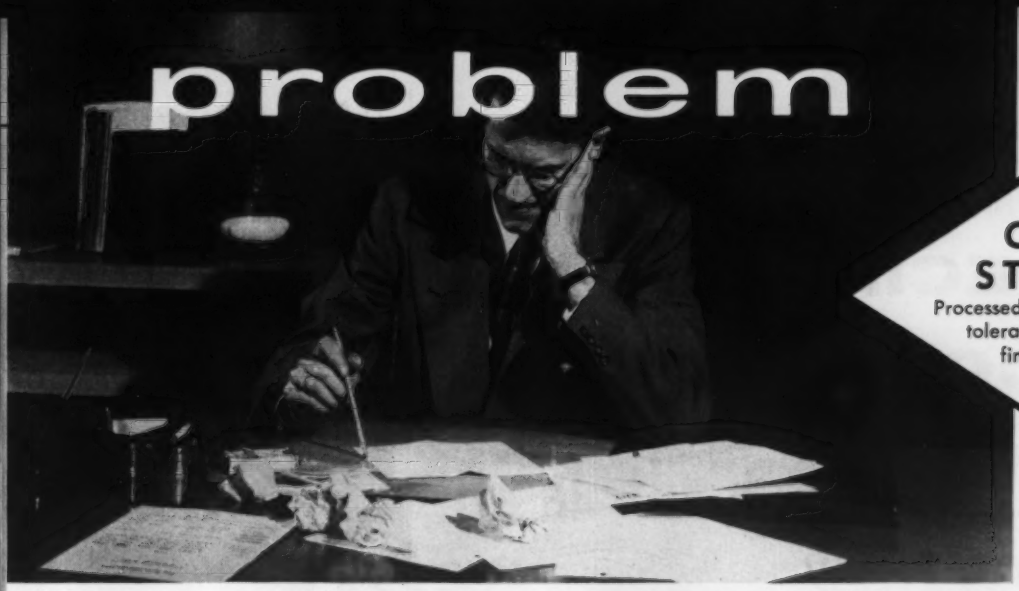
U.S. Steel Corp.'s Fairless Works still does not have its deepwater channel on the Delaware river. Five years ago this month when the corporation broke ground for the plant, deepening the channel was considered an important adjunct to the economic feasibility of the works. It's more important than ever now, but the project is mired in a dispute over who will pay. The U.S. says it will not. The Philadelphia Port Area says it will not because improvement of inland waterways is a function of the federal government. U.S. Steel says it won't pay because such a development would benefit many other companies, too.

Gymnastics in Copper Prices

Due to heavy dependence on custom smelted copper, Revere Copper & Brass Inc. jumped its price on copper products 3 cents a pound Mar. 14. That's the second advance since primary producers raised their prices to 46 cents a pound. Primary copper men are still hoping to hold the price at current levels. But they admit that if Revere is followed by other mills, it may bring new pressure from Chile for a price hike.

J&L To Use Oxygen Conversion

Kaiser Engineers Division of Henry J. Kaiser Co. has licensed Jones & Laughlin Steel Corp. to use the new oxygen converter process for making steel. Kaiser will begin immediately to install the equipment at J & L's Aliquippa, Pa., works. The process will add more than 300,000 net tons annually to the plant's capacity. This will be the second oxygen converter installation in the U.S. McLouth Steel Corp. has the first.



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RESTRICTED SPECIFICATION
COLD ROLLED STRIP STEEL

Processed to meet special gauge tolerances and provide special finishes and physical properties . . . solves many fabrication, cost & performance problems.

Helping to overcome metal fabricating difficulties, improving products without skyrocketing costs or just getting costs down are usual events with **CMP.**

For example, the manufacturer who was heat-treating formed steel parts subsequently assembled with other components into a powered unit. The forming involves severe deformation and was hampered by lack of uniformity in the annealed strip steel. Distortion in the heat treatment followed, resulting in a low percentage of finished assemblies passed as satisfactory.

To minimize these fabricating difficulties, **CMP** developed a special annealing process for the strip. Using this steel, parts, when subjected to the manufacturer's standard heat-treating practice, were acceptable and yield was greatly increased.

At **CMP,** processing cold rolled strip steel to restricted specifications has been reduced to an exact science and **CMP** men have been trained to spot opportunities for solution of production cost and product improvement problems through application of restricted specifications.

Why not put your problems up to a **CMP** man?

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COLD ROLLED STRIP STEEL
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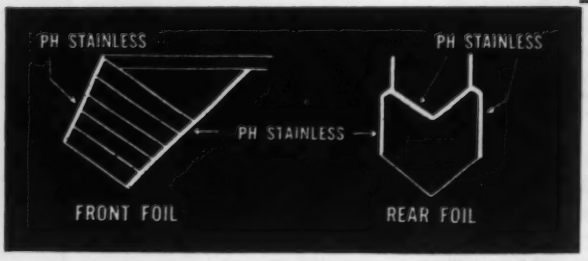
Low Carbon Grades • High Carbon Spring Steel (annealed and tempered) • Stainless Types • Alloy Grades • Electro Zinc Coated

SPECIAL ARMCO STAINLESS STEEL

Helps Navy Sailboat "FLY"



Skimming over the water is easy for the Navy's Monitor because its hydrofoils act like wings. As the boat picks up speed, water moving past the foils creates lift (like air passing an aircraft wing). Soon the hull is lifted above the water and the craft is free of the "hull drag barrier" which previously limited sailing speeds.

◀ Armco precipitation-hardening stainless steel bars were profile-milled to form side support struts of the large front foils, sides and upper "V" of the rear foil.

Sturdy support struts made of special Armco precipitation-hardening stainless steel bars frame the three hydrofoils of the Navy's Monitor—a "flying sailboat." These struts must be extra strong, for when the boat is "flying," all loads are carried through the stainless steel struts to the water.

Extremely high strength of Armco PH Stainless Steel bar helps the Monitor "fly" because it permits use of a thin section, reducing drag and keeping weight at a minimum. What's more, struts made of this special precipitation-hardening stainless steel offer good corrosion resistance.

Two Grades—The two Armco precipitation-hardening stainless grades, 17-7 PH and 17-4 PH, have solved product-problems for many manufacturers. They offer an unexcelled combination: Good forming and welding qualities in the annealed condition; after fabricating, high strength and hardness with low-temperature heat treatments.

Armco 17-7 PH is produced in sheets, strip, plates, bars and wire. Armco 17-4 PH is supplied in bars and wire.

For full information on these special stainless grades, call the nearest Armco Sales Office or fill in and mail the coupon.

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Break the Cost Barrier

A year ago at our house we decided to keep an accurate record of what it costs to operate the family automobile. We figured depreciation. We conscientiously kept tabs on all expenditures for gasoline, oil, grease, insurance, battery and tire service, tuneups and miscellaneous expenses — such as when the wife misgaged the width of the garage.

In January we added up our expenses. They came to $1387.62. We had driven 11,022 miles at a cost of 12.6 cents a mile, a figure somewhat higher than we had anticipated.

But we had forgotten to include parking charges. At the downtown garage where we park on workdays, the bill was $292.50. There was no record of odd dollars paid for parking when we went to a ball game, were touring or shopping —nor of tips we gave parking attendants when we ate out.

Many metalworking managers are in the same fix when they try to determine their true cost of doing business. The chief difficulty our editors met in researching "Know Your Costs" (No. 2 in STEEL's 1956 Management Series, page 83) was in finding metalworking executives who had the answers to true cost determination.

Many small and medium-size companies frankly admitted they lack adequate records or methods for detecting true costs. While cost detection and cost control still are relatively unexplored industrial frontiers, many companies, particularly steel and automotive, have made excellent progress. Their experience can serve as a guide to others.

Trade associations are conducting cost detection campaigns within their industries. Members gain a double-barreled advantage. Not only are they aided in learning their costs, but their competitors are helped to know theirs. Cost determination is one field where it pays to help your competitor. It may avoid ruinous price wars.

As General Motors' Harlow Curtice says: "Unless a manufacturer can sell his products for more than it costs to produce them, he soon will cease to be a manufacturer."

Cost reduction and profit improvement start with accurate cost knowledge. You may reap big benefits from a cost determination campaign in today's rich but hard-fought markets.

And don't forget the parking charges.

Walter J. Campbell

EDITOR

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a steel tube or bar for every purpose

TUBING: SEAMLESS AND WELDED

Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

That's because Ryerson stocks are the nation's largest, including more types and sizes, more tonnage, than any other source. And Ryerson service facilities are unequalled, too.

Hack saws, band saws and equipment for production lathe cutting and chamfering assure quick service on your orders. In addition, a staff of tubing specialists puts years of experience to work on your problems of tubing selection and fabrication. So call Ryerson for everything in tubing and tubing service.

In stock: Cold drawn and hot rolled seamless mechanical tubing, hot and cold rolled welded tubing, hydraulic and cylinder tubing, structural tubing, etc.

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Careful handling, accurate cutting, vigilant inspection—these are just three of many ways in which Ryerson assures you of the highest quality in cold finished bars.

Stored in temperature-controlled rooms, spark-tested to guard against mixed steels, Ryerson cold finished bar stocks include rounds, squares, hex's, flats—screw steel, accuracy stock, turned, ground and polished shafting, Ledloy for fastest machining—everything you need. And even the hard-to-get intermediate sizes are on hand.

To help you select the best cold finished bar for each application, we have just published a simplified guide showing the comparative strength, cost, machinability, workability, etc. of all commonly used types. Write for your copy and call Ryerson when you need high quality cold finished bars.

RYERSON STEEL

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NEA

Though neither side has won the Westinghouse strike, union leadership has been outgeneraled. Loss of face may force a shake-up in its top brass

JAMES B. CAREY and his International Union of Electrical Workers have lost the Westinghouse strike.

Up to last Friday (Mar. 16), wage loss was some $90 million. And the blow to union prestige can't be measured in dollars. In private, other union leaders are sharply criticizing its handling of the strike. Some labor observers have said: "Jim Carey has made the IUE our most ineffective major union."

Battle Lines — Westinghouse Electric Corp. hasn't won, either. The company's annual report said: "Shipments during the strike period thus far (Feb. 21), have been an estimated $250 million below the total expected." But it looks like management is winning two of its major objectives: A five-year competitive contract and a reinforced position on the time study question.

The company has managed to hold production losses to a minimum. In strikebound plants, shipment schedules are delayed, of course. Though there has been some switching of orders (competitive manufacturers are working overtime), losses are being cut by subcontracting and transferring work among plants.

Scoreboard—Orderwise, performance has been affected less than might be expected. One heavy equipment purchasing agent comments: "The Westinghouse trouble is but a small part of a general picture of difficult procurement." The company's sales force has worked full time, helped by promises like this: "After the strike, production at our transformer plant in Sharon, Pa., will be much higher than ever before. Some lines will be regeared to turn out up to 30 per cent more production."

Of the company's 98 plants, 58 were unaffected. At the others, production is steadily coming closer to normal. By Mar. 8, 7436 one-time strikers had joined back-to-work movements. The company has signed contracts covering 26,000 employees at latest count, many with unions affiliated with the AFL-CIO.

Shake-Up?—Nobody wins in a war. But it seems that while Westinghouse has managed to solidify its ranks, union leadership has lost the initiative. With the $90 million gone in wages has gone the confidence of many of its members.

When the smoke clears, some observers are looking for a shake-up that will put new men into IUE's top jobs. Such a movement, they say, would not be opposed too strongly by other labor leaders.

How SUB Plans Measure Up

Vested Income Security: Advantages

1. No tie in with state unemployment compensation laws, permitting easier administration
2. Less socialistic in principle than Ford-type
3. No tendency to narrow the pay gap between skilled and nonskilled employees. In practice, it will tend to broaden the gap because the skilled employee is normally less affected by layoffs
4. In reality, income security plans are a genuine pay raise for all employees covered
5. Has greater potential as management tool to improve employer-employee relations

Disadvantages

1. It will cost more if current Ford-type plans remain unchanged

SUB: Tailor It To Fit

AN ESTIMATED 8000 skilled workers in Detroit are threatening to bolt from Walter Reuther's United Auto Workers. The Supplemental Unemployment Benefit pact with the auto companies touched off the splinter movement last summer.

When Clark Equipment Co. last year negotiated a SUB plan with the CIO auto workers, members of the AFL auto workers balked: They wanted a vested plan in which each employee has an individual account.

The story repeated at Eaton Mfg. Co. and Euclid Division of General Motors Corp.: The CIO demanded a Ford-type SUB. Independents wanted vested income security plans.

Significance—In preparing for a possible SUB demand (See STEEL, Mar. 5, p. 51), you'll have to determine what the two major types of plans are.

The basic difference between the two plans is this: The Ford and can company type plans are designed for one objective: To supplement state unemployment compensation. The Euclid or individual income security plans are enforced employee savings programs. Each employee has his own fund and a choice of several methods of withdrawing his money.

Opposition—When Ford signed for SUB last June, the National Association of Manufacturers and many regional employer groups protested adamantly: The plan is socialistic; unemployment compensation should be left to government agencies. It provides a tremendous trust fund for which final disposition could bring many problems. It tends to destroy employee incentive to find other work when unemployed. It tends to destroy labor mobility.

Several unions and employee groups were also against it. The skilled worker gets little or no benefit. It tends to break down the seniority system.

New Look—Then the income security plan with vested accounts for each employee was developed by the glass companies. This is the plan that's getting most of the attention from both management and employee groups. Emphasizes a Cleveland labor executive: "Vested plans offer a tremendous employee relations potential to management."

Each employee has his own account. The skilled and senior workers are not footing the bill for the job hopper or marginal employee. If the worker can get by without drawing from his fund when unemployed, he's still earning interest. If he quits, retires, dies or is discharged, he gets the full amount in his personal fund. An income security plan is a genuine pay raise to all employees.

Pros and Cons—Vested programs offer an advantage of flexibility. Clark Equipment and the glass plans provide fund withdrawals for protracted sickness. Possible, too, is the incorporation of some of the credit union and profit sharing features like borrowing from the fund in an emergency, interest free.

But don't overlook some problems with vesting. One big consideration: Your layoff experience. Numerous layoffs per year, extended layoffs or layoffs affecting a large segment of your total work force make vested plans less attractive. At a nickel an hour, each account gets only $100 per year—

2. With unfavorable layoff experience, worker may get less individual protection than under Ford plan

Ford-Type Plan: Advantages

1. Cost under present contracts will be reduced as general fund maximum is reached
2. Meets the need for which it was designed—provides supplemental compensation to workers in need of it
3. Worker has more initial protection when benefit payments begin this summer

Disadvantages

1. Administration may become complex, because of tie in with state laws
2. It's creating unrest among skilled and high seniority workers
3. Employee has no method of recovering the 5 cents except by layoff

a fund that wouldn't last long with $20-per-week withdrawals.

Argument—Many opponents of the Ford-type plan view the huge SUB fund as a target for the union to keep sniping at. They feel Walter Reuther will be seeking such extensions in 1958 as: 52 weeks of benefits like the can companies, benefits for lost time due to sickness and injury, severance pay, short-work-week pay and death benefits—all of which will tend to up the company contribution requirement.

"But," points out one Chicago personnel executive, "don't overlook the worth-while possible uses of that big fund. One example: employee displacement problems. Suppose you automate an assembly line; you'll need more skilled workers and less nonskilled. Why not use the fund to train your unskilled worker for the skilled job? Perhaps in the same situation movement of personnel from one plant to another is involved. Why not use the fund to help finance the move?

"The SUB fund is designed to relieve the stress on employees during an emergency. We in management have an equal right—and obligation—with the union in determining any expanded uses of the fund."

Trends — Most labor observers feel that the large companies which accept SUB will tend to favor contracts incorporating the Ford and can company plans this year. Smaller firms in which there is normally a closer employer-employee relationship will favor the vested income security plans.

Watch the big steel negotiations starting in June. You may see a plan emerging which combines the Ford and income security plans. It could work like this: Steelmakers contribute 5 cents per hour per worker until a maximum fund is reached, then the 5 cents goes into the individual accounts. Company contributions would then oscillate —into the SUB fund when payments reduce it to a minimum level, back into individual accounts when the fund hits the maximum.

The compromise would benefit the skilled workers and at the same time provide extra layoff benefits—the original intention of SUB.

Financing—Cost is still a major factor in any SUB plan—many medium and small companies are worried less about which plan they'll adopt than how they'll pay for it. As the plans stack up currently, the Ford type with its declining costs as the general fund is built up is the least expensive. Several companies have settled for less than the 5 cents per hour: Continental Can pays 3 cents but has a 2-cent contingent liability; Albion Malleable Iron Co. developed a modified Ford plan which costs less (STEEL, Mar. 5, p. 51); Eaton Mfg. Co.'s vested program calls for a 3½-cent-per-hour contribution. But most executives feel that the 5-cent contribution will continue as the pattern.

An alternative worth your study, particularly if you're a medium or small firm, is a SUB program paid from a profit sharing plan. The Council of Profit Sharing Industries, Chicago, reports that several of its members have a profit-sharing-financed SUB plan, including Leeds & Northrup, Philadelphia; Commercial Steel Treating Corp., Detroit, and Bell & Gossett, Chicago. Others are in the process of developing plans.

Mongrels—Some executives say SUB and profit sharing are different breeds of dogs and shouldn't be mated. But proponents reply: They answer cost problems and often do the job better, particularly for smaller firms. Most profit-sharing SUB plans are of the vested income security type.

"Take a look at some of the advantages," says James I. Poole, Milwaukee labor consultant:

1. You have a fixed contribution obligation. That's essential no matter how SUB is financed.

2. The obligation is in direct proportion to company prosperity. With conventional plans, contributions are a fixed cost regardless of whether profits are made. With this type plan: No profits, no contributions.

3. The business cycle works to the advantage of SUB—in good years the contributions are high and withdrawals low, permitting a more rapid fund build-up.

4. Employee incentive is stimulated. Not only has he an incentive to protect his vested fund by keeping employed, but he has a definite stake in helping you to earn a profit.

5. This type payment tends to be less inflationary.

6. Success of profit sharing by some of the leading companies in

building up sizable individual accounts has proved to be a tremendous factor in reducing employee turnover.

Contributions by companies with profit sharing systems vary widely, but the law provides an automatic built-in ceiling on how much can be contributed—15 per cent of the compensation of the employees covered.

Dogfight—The basic philosophy of unionism will tend to keep unions from approving profit sharing plans, most experts feel. But experience by leading firms in the movement may bring employee pressure on the unions to take a new look. Employees in one Milwaukee firm already are grumbling: The company offered a vested SUB plan financed from profit sharing, and the union turned it down. The year-end statement showed that in 1955 the company's contribution under the proposed profit sharing plan would have been 20 cents per hour instead of the 5 cents the union demanded and got.

For companies with profit sharing programs already set up, the integration of SUB is a natural—and probably won't cost anything extra. It'll amount to extending benefits like 100-per-cent vesting immediately instead of requiring a waiting period, permitting withdrawals instead of waiting for employment termination, etc.

Tailoring—Of all the fringe benefits management has had to face, none offers the complexity of SUB. No benefit has ever before been tied directly to your economic operations. SUB is another hazard to the marginal firm. SUB should further elevate the worker, sharpen management practices.

But most important, SUB is not a package with specific dimensions for all industry. If you grant layoff benefits, tailor the plan to fit your operations.

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Furnace Blown In

Youngstown Sheet & Tube Co. has blown in its No. 3 blast furnace at the Campbell Works. The furnace was out for 44 days for a relining job. It has a capacity of 1100 tons of pig iron a day.

U.S. Steel Details Expansion

Improvements of open-hearth furnaces at Gary and South Chicago will add 1.2 million tons to steelmaking capacity. The work will be completed within 18 to 24 months

THE LARGEST steel mill in the world is going to be even larger. U. S. Steel Corp.'s Gary Steel Works, Gary, Ind., will increase its steelmaking capacity by 700,000 tons, which will result in a total annual capacity of almost 8 million tons.

U. S. Steel's South Works at South Chicago, Ill., will produce an additional 500,000 tons to bring its total to almost 6 million tons. Both projects are part of the 14-million-ton expansion of this country's steel industry scheduled to be completed within the next three years (STEEL, Mar. 5, p. 62).

Improvements — The expansion will be accomplished by improving the open-hearth furnaces over a two-year period. The additional 1.2 million tons is 300,000 tons short of the announcement made last November by U. S. Steel, but the full amount probably will be obtained if all goes well. The cost of the program was not revealed.

Roger M. Blough, chairman, U.S. Steel, reported on the expansion plans at a banquet commemorating the 50th anniversary of the start of construction of the Gary Steel Works.

The firm also plans to improve the 44-in. slabbing mills at both Gary and South Works to increase capacity for rolling ingots into semifinished form.

More Sheets — The Gary sheet and tin mill will get new production facilities, including: A hot strip mill; a pickle line; a cold mill; new batch annealing furnaces; new temper mills; a line for recoiling sheet after it emerges from temper mills; and a flying shear line.

Mr. Blough stated this program would result in more flat-rolled products, notably sheets.

Plans have been developed for a new mill at South Works for the rolling of structural sections, such as lightweight, wide-flanged beams. There will be additional sintering facilities at both Gary and South Chicago.

Subsidiary—At Buffington, Ind., construction is proceeding on a 3-million-barrel-per-year plant for Universal Atlas Cement Co., a U. S. Steel subsidiary. When completed its total capacity will be 10 million barrels.

Relief for Reconditioners

A critical shortage of used steel barrels and drums threatens 400 reconditioning firms, says the Business & Defense Services Administration's Used Steel & Wood Barrel Industry Advisory Committee.

Prices of used drums almost equal new ones, and inventories are down to a week or less for some firms, compared with the normal 45-to-60-day supply. Committee members want the Armed Services to release surplus used drums.

Government Zirconium Again

The Bureau of Mines is putting the government's zirconium plant at Albany, Oreg., into operating condition at the direction of the Atomic Energy Commission. Annual capacity of the plant is 300,000 lb of zirconium and several thousand pounds of hafnium. It was shut down last spring when private industry started producing zirconium in quantity.

Options Offered on Pensions

U. S. Steel Corp. has agreed with the United Steelworkers of America to permit employees participating in the corporation's pension plant to designate a co-pensioner for the noncontributory part of the plan. Two options will be offered: 1. To permit a reduced pension payable during the pensioner's life and continued after death to the co-pensioner. 2. To permit a pension reduced in a lesser amount during life with one-half the amount continued after death to the co-pensioner.

A similar option has been available for the contributory part of the plan since its inception in 1940.

Trainees get on-the-job time-study experience

Check Rockwell's system for one answer on . . .

How To Teach Time Study

WHAT'S the best way to teach the principles of time, methods and motion study to a company?

Rockwell Mfg. Co., Pittsburgh, thinks it has the answer: Set up a central school, take your students not only from ranks of potential time study men but also from potential management.

Reasoning — Before Rockwell started its school last fall, time study had been going on for seven years, but only on a small scale and at division level. Divisional industrial engineers had to spend too much time giving the training in their own plants. In addition, training took too long.

The new formal school operates 8 hours a day over successive three-month periods. Nine men were trained in the first class. Eight were for time study functions; the other was a foundry supervisory trainee. Management personnel were much more strongly represented in the second course. Five foremen and six time study men were included.

Aims—By the time the school is closed (Rockwell sets no date), all levels of production management will have been included among the trainees: Foremen, assistant foremen, setup men and promising production workers. They will be recruited from all the company's divisions.

Rockwell believes that the value of each man's training will be compounded by the spark-plug influence he'll have in his plant when he gets back on the job. The theory is proving out in practice. Many foremen were not enthusiastic at first. They're now back at work and completely sold on the value of the course.

Methods—To make sure it gets the most for its training dollar, Rockwell assigns its best qualified men to teach. Its headquarters industrial engineering staff and experts on such matters as standard data, plant layout, standard cost analysis and automation also are used.

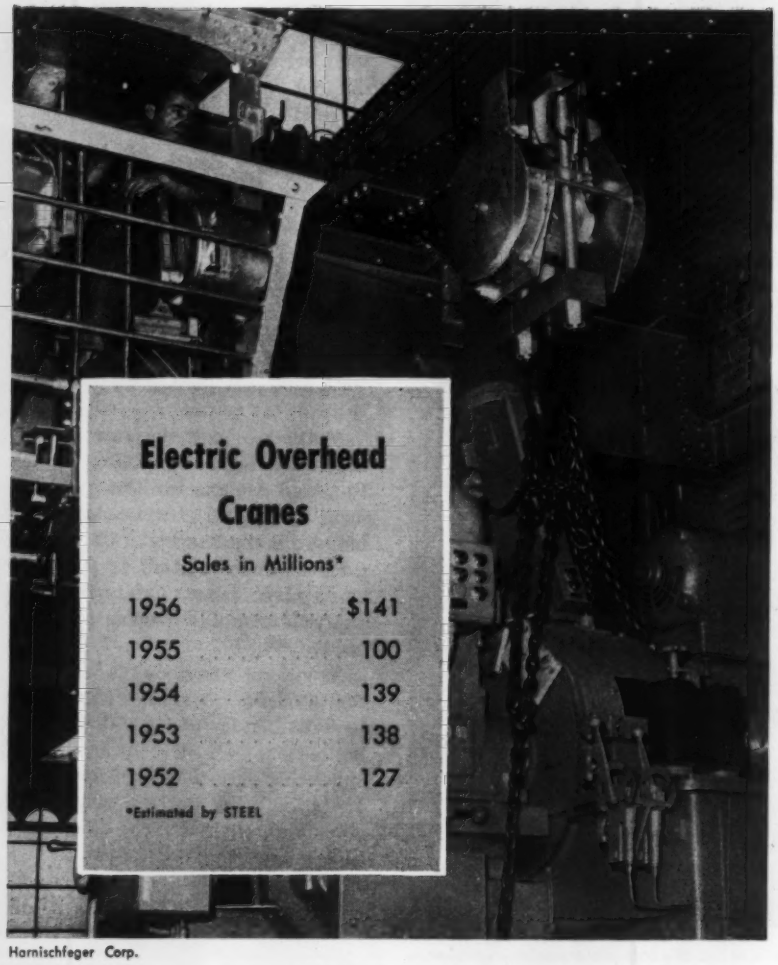
A special textbook is used by the students, covering such subjects as history of time study, selling ideas, job description, principles of efficiency, methods and operation analysis, motion economy, approach to the operator, time study computation and analysis and selling standards.

Students work from the book for the first two weeks, and make supplementary plant studies. Then they visit three representative divisions, where they work with a wide variety of industrial operations. Included: Gray iron foundry operations like coremaking, a wide variety of machining operations and of different types of assembly.

Evaluation — Since the success of the training depends on its application in the student's divisions, the school runs regular checks on the progress of its graduates. So far, no weak spots have turned up either in the training or in the benefits to the company.

The second class will soon be completed. The third will run from April through June. During the summer, a special 30-day version will be run for supervisors. After that, Rockwell says it will continue the courses "until the company's needs have been satisfied."

Strength of its faith in the school is shown by the cost: A conservative estimate puts the three-month bill for each man at $3600.



Harnischfeger Corp.

A built-in electronic crane scale cuts handling time

Crane Sales Pick Up

CRANE, hoist and monorail makers look for a 10 to 15 per cent rise in sales this year. Some expect more. For electric overhead cranes, the boost may be over 40 per cent.

M. J. Rice, vice president, Whiting Corp., Harvey, Ill., says: "We expect an increase in our sales volume for cranes of about 15 to 20 per cent over 1955's. Sales last year were more than double those of 1954."

Whiting Corp. makes overhead traveling cranes, electric hoists, Trambeam cranes and monorail systems. It's one of the ten members of the Electric Overhead Crane Institute, Washington, whose executive secretary, Joseph H. Peritiz, claims: "On the strength of backlogs, it looks like a banner year." A. W. Reidinger, secretary, Bay City (Mich.) Shovel Co., agrees: "We feel quite optimistic about 1956."

There are about 18 or 20 major manufacturers of crane and hoist equipment in the country. Another 30 or 40 companies fabricate special orders.

Their sales trend is pretty well indicated by the sales chart of electric overhead cranes (above). A slump hit them last year because decreased backlogs from 1954 showed up in shipments during 1955.

Expansion — Big push behind 1956 sales is the increasing rash of physical equipment expansions breaking out in all segments of industry. Harnischfeger Corp., Milwaukee, sums up the big uses of "Thru-the-Air" equipment this way: "Steelmaking expansion programs, road building programs (particularly cement mill expansion) and the expansion in the automotive industry are the factors most responsible for sales increases."

Other heavy buyers are foundries, power plants, electrical equipment manufacturers and warehouses. Newcomers are atomic energy plants which need cranes and hoists for automatic handling of materials.

Labor Saving — A. S. Watson, president, Detroit Hoist & Machine Co., points out: "People are becoming more conscious of automatic handling and controls. Pushbuttons have graduated from the kitchen into industrial applications."

Recent developments are electronic crane scales built into the bottom blocks of overhead cranes (see photo), automatic positioning and hooking mechanisms and direct-acting, direct-current rectifier brakes for alternating-current operated units. Today's hoisting and carrying rigs are considered machine tools with specific jobs to do. Some automatic units pick up loads, carry them to one of several destinations, stack them properly and then return for a second helping.

Although no major changes are being made in cranes themselves, control mechanisms are getting plenty of attention. A brisk business has sprung up in renovating older crane and hoist controls.

Shortages — Manufacturers say structural plates and I-beams are hard to get. Some find high tensile steels particularly tight. Many report they have to go to warehouses for materials; a few admit substituting whatever is handy.

Accompanying the material problems is a shortage of skilled help and engineers.

Delivery dates on standard models run six to eight months. Because much of this equipment is specially built, delivery dates must be estimated carefully.

Boeing 707 prepares to land after its first test flight

Who's Buying the Jets

Airlines	Boeing 707	Douglas DC-8
Air France	10	
American	30	
Braniff	5	
Continental	4	
Delta		6
Eastern		19
Japan Air		4
KLM		8
National		6
Pan American	23	25
SAS		7
Sabena	4	
Swiss		2
TWA	8	
United		30
Total	84	107

Jets Go Civilian

TWO AIRCRAFT companies are basking in the warm light of $1 billion in civilian orders for their trim jet transports.

Douglas Aircraft Co., Santa Monica, Calif., has firm orders for 107 DC-8s, which cost their airline buyers almost $600 million. Boeing Airplane Co., Seattle, Wash., has over $400 million worth of orders for 84 of its 707s. Boeing will start deliveries in October, 1958; Douglas in the spring of 1959.

Helpers—Each company expects to do a normal amount of subcontracting, but subcontracting could be heavier than normal, depending on delivery date pressures.

Here is an indication: "When KC-135 (the Air Force's tanker-transport version of the 707) was ordered at the Renton, Wash., plant, an expansion of Boeing's subcontracting program was announced. At that time 5212 businesses were helping Boeing's Seattle division build its B-52s and KC-97s. The KC-135 program meant reaching still farther into all parts of the nation for both major and minor components — the commercial jets will mean still more."

Sewed Up—Today, Boeing and Douglas have the U. S. commercial jet business carved up between them. Several other aircraft firms have jet transports on the drawing boards, but it's pretty well agreed that the first round of jet buying is just about over.

In turboprops (which have jet engines harnessed to propellers) it's another story:

Turboprops — The British-made Vickers Viscount caught the eye of Capital Airlines, then Continental. Some 60 are still on order, with deliveries running into 1958.

American turboprops include the Lockheed Electra, now moving from engineering and tooling to early production. Deliveries should start in late 1957.

Competition—The Electra won't compete directly with the Viscount — the American plane is bigger and about 100 mph faster. The Electra's competition will come from newer British and perhaps some French planes.

Another U. S.-built turboprop will be the 40-passenger F-27 to be made by Fairchild Engine & Airplane Corp., Hagerstown, Md., under license from Fokker. Fairchild officials feel the foreign-designed plane is just what feeder airlines are looking for to replace their aging DC-3s. This market, however, depends on a subsidy decision from the Civil Aeronautics Board. Airline view: Though subsidies would rise initially, feeder lines must get new equipment if they are ever to stand on their own feet.

In spite of the hurdle, Fairchild people say their sales prospects are getting better daily and that they'll soon have enough orders to justify an expected $15-million tooling job.

Hot Question—Are the airlines overbuying? They don't think so. Apparently, the people who are putting up the money agree. (Some of the funds will be borrowed rather than obtained through stock issues.)

One airline spokesman says: "In this business you've got to buy ahead. We're in the same position we were three years ago when people said we overbought — and in those years traffic exceeded authoritative estimates by some 50 per cent."

Congressional fondness for tungsten stockpiles may mean . . .

More Tungsten Above Ground

CONGRESS is moving to extend the life of price supports for domestic tungsten producers.

The present program provides for government purchase of 3-million, short-ton units (20 lb each) at $63 a unit, compared with the current world price of $34-$34.50 (plus about $8 duty). The program was planned to carry the industry until July 1, 1958, but U.S. tungsten production under the impetus of the government price has been higher than was thought it ever could be — 1.66 times consumption last year. Result: The 3-million unit limit will be reached by this June or July, two years ahead of schedule. The bills would provide for purchase of another 3-million units over the period ending June 30, 1959.

Squeeze — And without the government program, U.S. tungsten producers will be forced out of business, say industry spokesmen and congressional sponsors of the bills. Reason: The price spread between U. S. and foreign ores caused by the difference in wage rates here and abroad.

There are two conflicting views in the government on how to handle the tungsten problem: 1. American producers should be subsidized so the material will be above ground when it is needed — in event of war, we may not have time to reopen mines and to prospect for new ore bodies. 2. The tungsten should be left in the ground for emergency, and we should continue to use foreign material as long as it is readily available at a favorable price.

Need for Speed—It's said the administration holds the latter view which could mean trouble when Congress gets around to action. And that action will have to come fast if producers are to know where they stand when the current program is filled three months from now. Hearings are expected to be scheduled soon.

The major reason to extend the purchase program is the defense aspect. Sen. James Murray (Dem., Mont.), in introducing the bill on behalf of himself and five other senators, said: "I believe this bill, if enacted, will play an important part in avoiding World War III, or should World War III eventuate, will assure an adequate supply of one of the most strategic materials." Tungsten is needed in the development of more rugged turbojet engines, higher speed planes and long-range ballistic missiles, as well as nuclear power plants.

Catching Up — Senator Murray added: "It is estimated by economists that by the end of three years, or by June 30, 1959, the domestic consumption of tungsten will be sufficient to absorb all the tungsten imports, plus substantial portions of the domestic production . . ."

One of the big uses of tungsten is in jet engines — 100 lb in the much-used Pratt & Whitney J-57, with a higher amount in newer versions, even though the Pentagon rates tungsten as a material likely to be in short supply in wartime and specifies other materials where possible.

The Office of Defense Mobilization, which is responsible for stockpiling, says the stockpile is adequate under present policies, though that thinking could change if, as rumored, the Pentagon has in the works a project that will call for greatly increased use of tungsten.

Meet Joseph P. Crosby: He's director of the Metalworking Equipment Division, Business & Defense Services Administration. On leave as vice president and director of Lapointe Machine Tool Co., Hudson, Mass., Mr. Crosby will work with BDSA for about six months. He can be reached in Washington at room 4015, Commerce department. Phone STerling 3-9200, ext. 3525.

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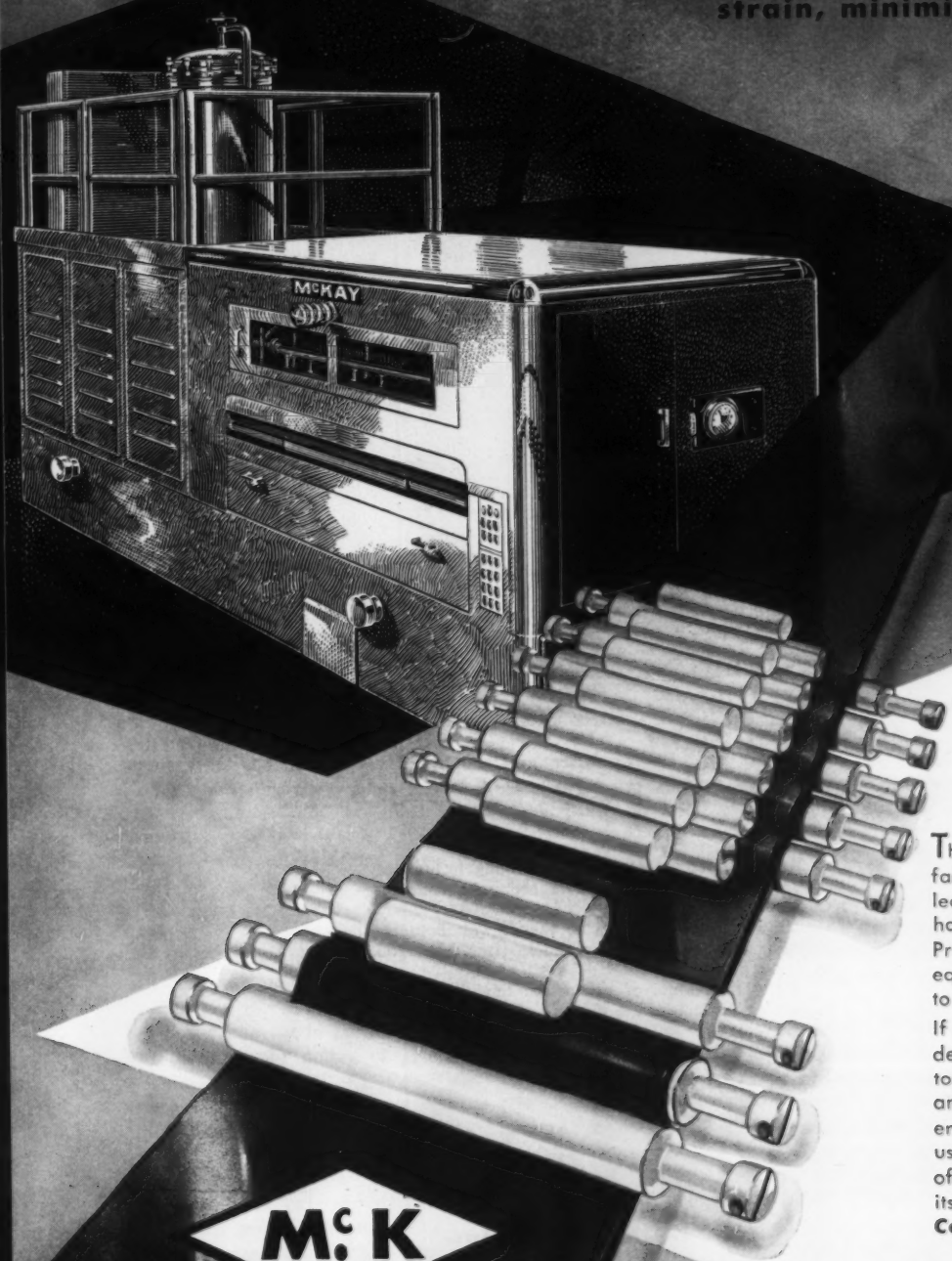

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How Rheem's Virtanen Finds Managers

"THERE'S an empty building; here are some blueprints and samples. Start producing furnaces."

That, in effect, was the assignment Rheem Mfg. Co., Chicago, gave A. W. Virtanen in December, 1949. By March, 1950, furnaces were coming off the production line. The accounting department opened the plant's books on Apr. 1, and at the end of the month, the operation showed a profit.

Key—Any magic formula involved? "None," says 39-year-old Virtanen. "We were careful to select good men for the job—the rest was teamwork."

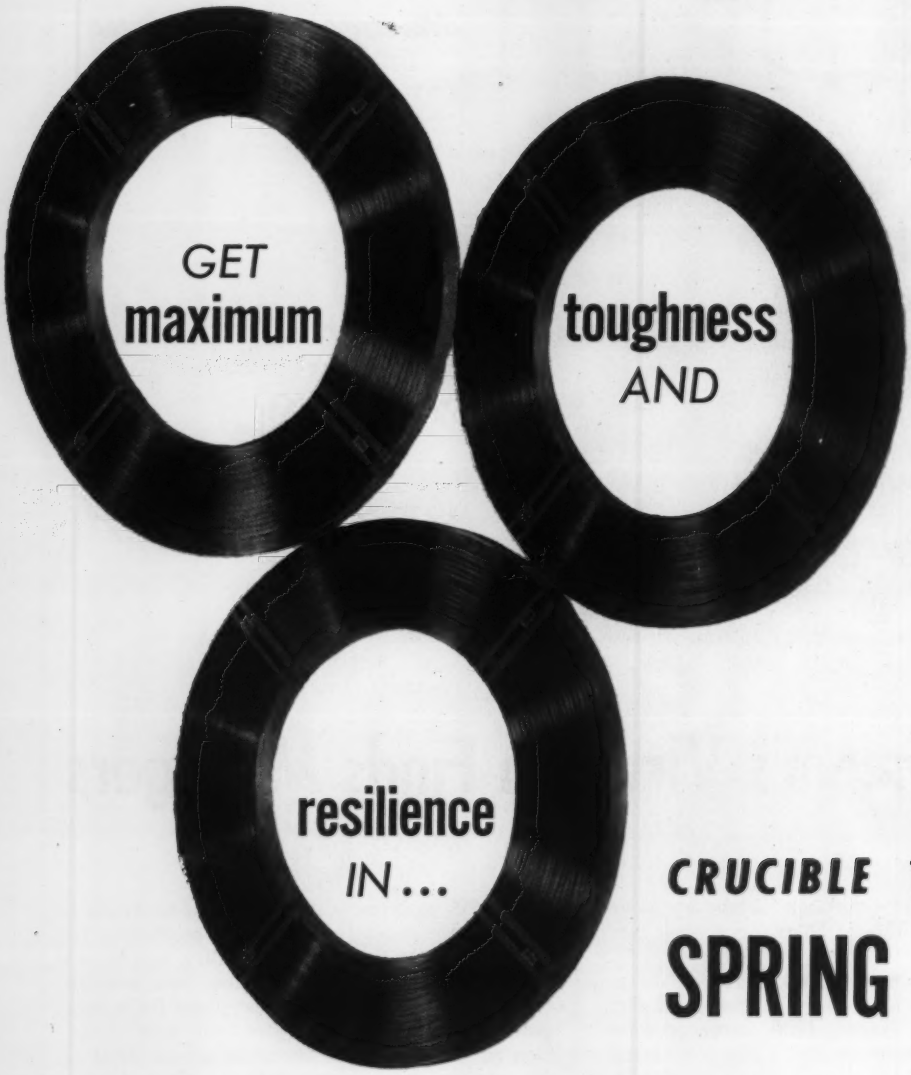
"And," he quickly points out, "selecting the key men for the new plant didn't mean going outside the ranks of the company. Even though we never had made furnaces in Chicago before, we stuck to our policy of promoting men from within Rheem."

Make Your Own—When a company is setting up a new plant, it can recruit its top management for the new facility three ways: 1. It can hire from the outside. 2. It can move top management from existing divisions into the new plant and promote men within the divisions to fill vacancies. 3. It can take junior executives in existing divisions and move them out to head up the new plant.

"We prefer the third," Mr. Virtanen emphasizes. "Capable men are always to be found in middle management ranks. They're waiting for the opportunity to show their ability, and there's a real advantage in giving these men new responsibility: They provide new blood for a company's management; they've got new ideas; they're bursting with enthusiasm—all vital to the success of a new operation. Another factor: By maintaining existing top management of a successful established operation, you don't risk upsetting it."

Success Story—Bill Virtanen is himself a product of Rheem's promotion-from-within policy. He joined the company in 1947 as assistant chief inspector after serving with the Army Ordnance Corps in World War II. After setting up the furnace plant, he held the posts of works manager and plant manager in Chicago. In 1954 he went to Houston as regional manager and was largely responsible for the improvement in the profit picture of that plant.

Much of Mr. Virtanen's education has been gained through night school courses at the Detroit Institute of Technology, Illinois Institute of Technology and University of Chicago. "Those classes plus raising three youngsters and keeping pace with Rheem, haven't left much time for hobbies," he relates. "But I do a little amateur photography and hope to develop that activity as time goes by."



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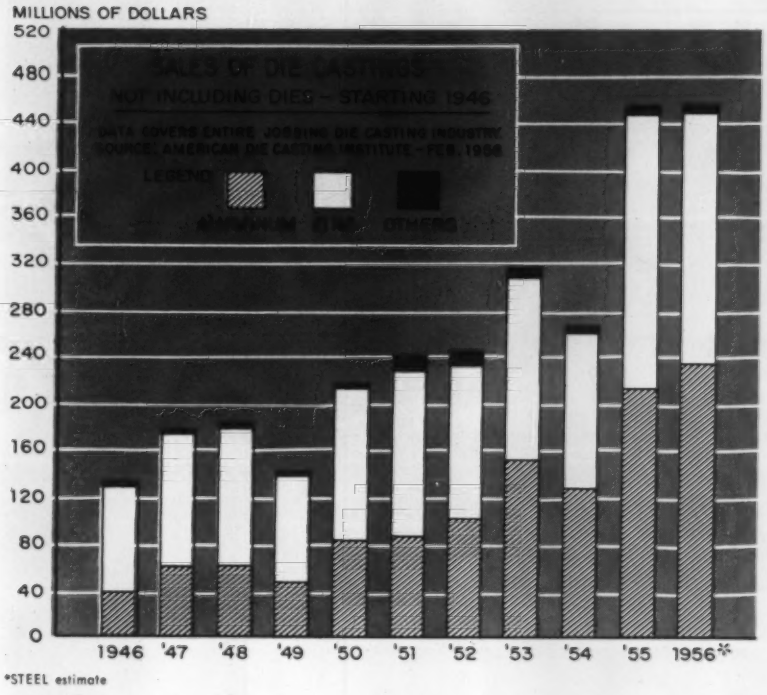

Record year in '55 buoys diecasters' hopes for . . .

Peak Sales in 1956

JOB SHOP diecasters registered sales of $457.5 million in 1955 (see chart). This is a 40-per-cent increase over the record set in 1953, reports David Laine, secretary, American Die Casting Institute.

Metals Used — Zinc and aluminum led the expanded-use parade, with magnesium showing gains, too. Brass diecastings remained at average production levels.

Job shops, reports the institute, account for 67 per cent of the zinc and 77 per cent of the aluminum diecasting metal consumption totals. The balance represents captive production by end product manufacturers.

1955 — Total captive and job shop use of metals shows: 1. Some 410,000 tons of zinc—almost 40 per cent of total slab zinc production—were used last year. Special High Grade replaced Prime Western as the leading grade of zinc for diecasting for the first time, even though Special High Grade carried a premium of $30 a ton (now $35). 2. Aluminum diecasting requirements called for 192,500 tons of the lightweight metal. Of this total, 176,000 tons were used for aluminum diecastings, 16,500 tons for zinc diecasting alloys.

Future — Advocates point out that there is a growing demand for diecastings in the appliance and electronics field. But the ADCI distribution survey of job shop sales reveals that 59.6 per cent of the zinc tonnage, 43.3 per cent of the aluminum and 37.5 per cent of the magnesium tonnages were used by the automotive industry. Home appliance totals: Zinc, 18.5 per cent; aluminum, 18.7 per cent; magnesium, 7.6 per cent.

Crux—This year's outlook is tied closely to the Motor City. While nonferrous men are giving various estimates, there is a growing acceptance that aluminum volume will increase 5 to 10 per cent if the automotive production dip is not more than 12 per cent. Zinc will fall somewhat below record-breaking 1955 levels; magnesium will continue to gain.

Canadian Builders Will Pay

To get around the shortage of steel, Canadian builders are paying fantastic gray market prices, says A. Turner Bone, president, Canadian Construction Association. Some European suppliers are reported offering steel to Canadians at $200 a ton.

Last year, Canada imported 281,476 tons of structural steel. T. N. Carter, vice president of the construction group, believes builders would pay $120 a ton for Canadian steel ($20 over the current price), if the mills would increase production to cover Canadian needs.

The question of getting enough steel to take care of Canada's booming construction industry was raised before the Gordon Economic Commission as it attempted to assess the outlook for Canadian construction over the next 25 years.

U.S. Inventories Real Estate

The federal government owns 21.4 per cent of the continental U. S. Since 1789 its purchases of real estate have totaled $32.5 billion.

These and other facts appear in an inventory report on federal real property made by General Services Administration.

The report shows that as of June 30, 1955, the government owned land costing $2.4 billion, buildings costing $14.5 billion and structures and facilities (for power development, flood control, etc.) costing $15.6 billion.

Multi-Metal Presses

New Air Force requirements will call for extrusion and forging presses capable of working titanium and steel, as well as aluminum. The 20,000-ton extrusion press originally scheduled to be built by Aluminum Co. of America, Lafayette, Ind., will now have to fit these requirements, government sources say.

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Foys, boring mill operator at Fuller Company, Manheim, Pennsylvania, manufacturers of conveying equipment, coolers, compressors and vacuum pumps. Also, he says, "there are no levers to mess around with. On the Bullard H.B.M., Model 75, I can mill on a 45° angle in any quadrant instead of having to jockey in one direction, then in the other — like I had to do on the old machine."

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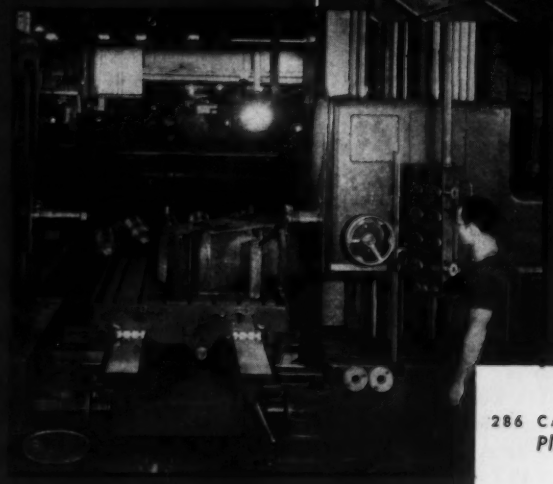

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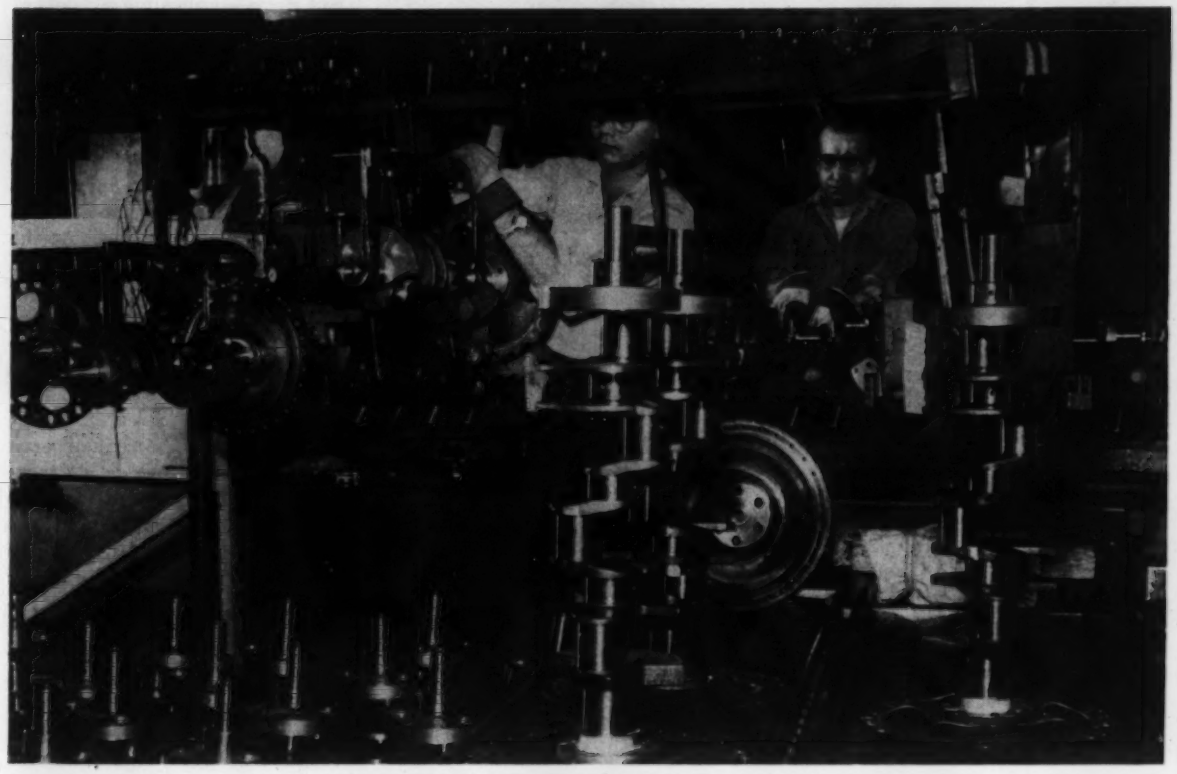

Shell molded units join Pontiac's engine assembly line as . . .

Cast Crankshafts Take Over

PONTIAC Motor Division, General Motors Corp., is using crankshafts made from shell molded Armasteel—GM's tradename for pearlitic malleable iron.

Partial production at GM's Central Foundry Division plant, Danville, Ill., started last August. This month will see shell molded crankshafts on all '56 Pontiacs. Presumably, other GM divisions will be using them on 1957 models.

The First — R. M. Critchfield, Pontiac's general manager, points out that this is the first cast crankshaft to be used in regular production on any GM car. Most automakers use forged steel cranks, which are more expensive because of machining and material costs.

Although pearlitic malleable iron has been used for automotive rocker arms, universal joint yokes, diesel engine pistons and other parts, this is the first time it has been combined with the shell molding process for quantity production runs.

Advantages — The forged V-8 crankshaft Pontiac used had a rough weight of 76 lb; machined weight, 58 lb. The Armasteel crank has a rough weight of 64 lb and weighs 54 lb after machining. Ten lb of machining is saved on each crankshaft.

High tensile strength of the casting material allows greater freedom in grinding, drilling and turning operations. For example, one of the more expensive operations is grinding the sides of counterweights on forged crankshafts (cheeking). Cast crankshafts do not require this step.

Because more excess weight must be trimmed off forged cranks, material costs have been cut substantially. Comparisons aren't readily available, but it seems probable that labor costs can be cut a third with the cast units.

Some saving also results because pearlitic malleable is less expensive than forging steels. Heat treating and the addition of alloys turn malleable iron into pearlitic malleable. The amount of alloy needed to make Armasteel is extremely small: 2 parts in 10,000 of bismuth and 4 parts in 100,000 of boron.

Longevity—Perhaps longer tool life is one of the chief advantages of Armasteel. Pontiac engineers say that the life of high speed tools has been quadrupled in many cases. The life of carbide cutting tools has been extended almost ten times.

Another important factor is the greater uniformity of the crankshaft, which makes for accurate balancing. Mr. Critchfield sums it up: "The ease of machining, plus a considerable reduction in tool and material costs, have exceeded

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GMC Truck & Coach Division announces "Blue Chip" line

Standard equipment on this de luxe pickup includes tubeless tires, 180-hp V-8 engine and 12-volt electrical system. Optional are GM's road shock dampers, four-speed Hydra-Matic transmission and wide-range, one-shift axle

even our optimistic hopes when we decided to switch from a forged to a cast crankshaft."

Switch — The move to a cast crank was started early in the Korean War when Central Foundry began experimenting with the non-critical material. At that time it seemed that casting a crankshaft would result in better machinability, wider design latitudes and lower costs.

Pontiac became interested in the summer of 1954 and got its first Armasteel crankshafts (24 of them) in November of that year. During August, 1955, Central Foundry shipped the equivalent of 25 per cent of Pontiac's production.

Manufacturing — High volume production has called for plenty of mechanical transfer equipment at the Danville foundry.

Material for making the casting shells is transferred in a closed conveyor to shell making machines. Mix is invested onto preheated patterns which are oven cured. Then the half shells are stripped from patterns. One shell machine makes the bottom half of the shell (drag); another machine turns out the top half (cope). Copes and drags are glued together and bedded in sand — all these operations are automatic.

Pouring — As the shells, now buried in sand, move along a molding conveyor line, an operator pours 300 lb of iron into each one.

After 30 minutes of cooling, the castings are broken out of the shells automatically and transferred to an annealing department for initial cleaning and inspection.

Hot Press—Annealing consists of an air quench followed by a drawing operation. Each crank (its temperature is about 1000°F) is fed automatically into a hot press which hits it twice. This straightens any bends it may have picked up in heating and handling operations.

Grinding follows as the castings move along a cooling line. At the next station they are given a Brinnel hardness test. Then they are milled and center drilled.

As a final test, the castings go through a sonic test chamber, which works on the tuning fork principle. A hammer at the base of the test chamber rings each crankshaft. The tone is electronically measured, and if it is in the correct range, a dye mark is sprayed on the casting, which shows it is ready for shipment.

Design-wise, the cast crankshaft shows many possibilities. It is feasible to cast 6 and 8-cylinder cranks on the same production line with little change in equipment except for casting shells.

Shape and location of counterweights have been limited by the forging process. Casting allows counterweights to be made thinner and placed closer together. These factors are important because engine designers slowly are regaining ground lost to body stylists during the postwar buying rush.

It seems probable that shell molding, plus pearlitic malleable iron, will answer many future problems in the production of automotive parts.

U. S. Auto Output

Passenger Only

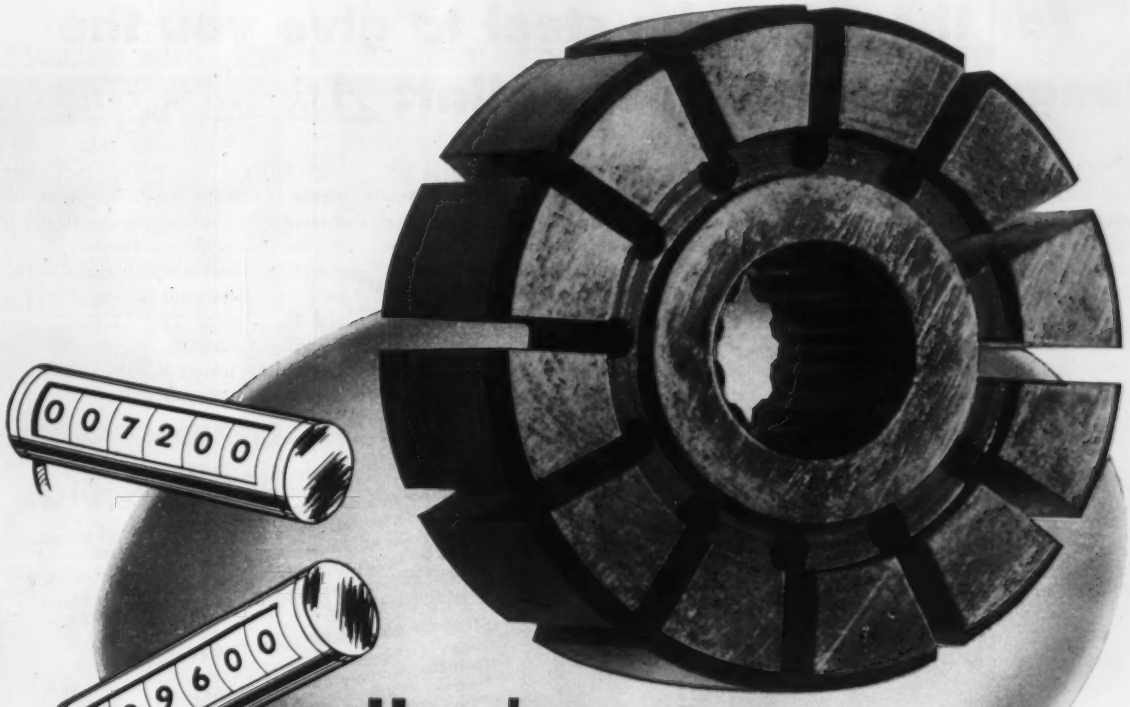
	1956	1955
January	611,190	659,508
February	554,667†	675,769
March		794,188
April		754,007
May		724,891
June		649,372
July		659,979
August		614,392
September		461,592
October		517,669
November		748,559
December		682,698
Total		7,933,369

Week Ended	1956	1955
Feb. 11	136,308	168,059
Feb. 18	128,324	173,482
Feb. 25	125,502	171,188
Mar. 3	132,889	167,811
Mar. 10	133,331†	171,346
Mar. 17	132,000*	176,194

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

Exhaust Notes

Clare E. Briggs, sales vice president of Chrysler division, Chrysler Corp., says: "The automobile industry is beginning to experience a seasonal upturn in sales. Present indications are that we are entering an accelerated business period which should continue throughout the year." The division reports 5351 Chrysler cars were delivered by dealers in the final ten days of February. This is a 60 per cent jump over the previous ten days. Total monthly sales were up 23 per cent over the same period last year; 19 per cent over January, 1956.



Here's a story that COUNTS

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A manufacturer of hydraulic pumps was averaging 7200 pieces per set of tools used in milling slots on this hydraulic pump rotor. By switching to Copperweld Leaded Steel, this tool life was increased to 9600 pieces.

In addition to longer tool life, leaded steel gives faster feeds and speeds, and a finer finish often eliminates a clean-up operation—truly, the steel with "built-in productivity." To put more operating profit in your production picture, try Copperweld Leaded Steels.

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EXPORT: Copperweld Steel International Co., 117 Liberty St., New York 6, N. Y.

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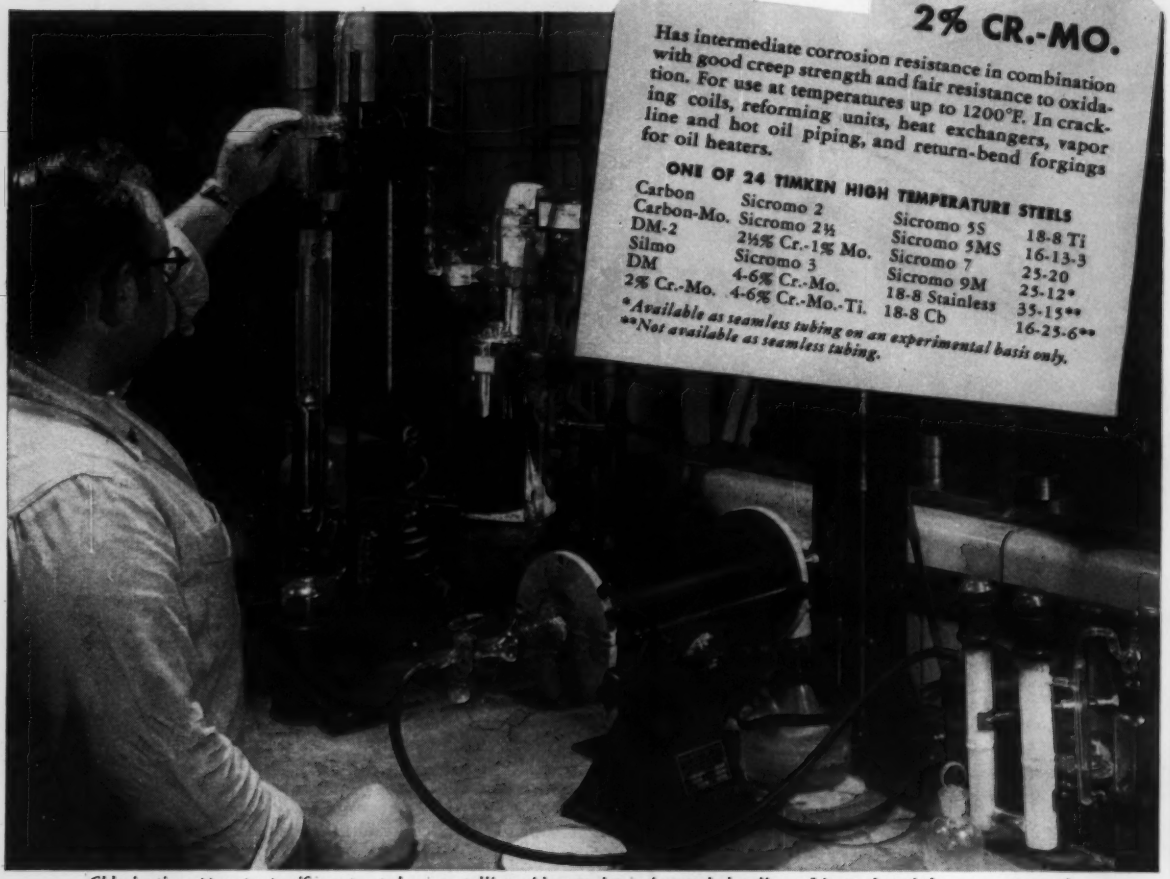
CHANCES are that there are several different analyses of tube steel that could solve your particular combination of heat, corrosion, pressure and oxidation problems. But there is only *one* steel that can give you the lowest tube cost per year of required service—the best life/cost ratio.

To find that one steel, *ask the experts!* Ask the Timken Company metallurgists, recognized authorities on high temperature steel tubing. When you consult these experts, you get the benefit of over twenty years' experience with high temperature steels. From the wide range of Timken® fine alloy steels, they can help you select the one that is best for your requirements. And whatever analysis you choose, you'll be assured of uniform high quality. The quality of Timken steels is controlled from melt shop through to the final inspection with the most exacting methods.

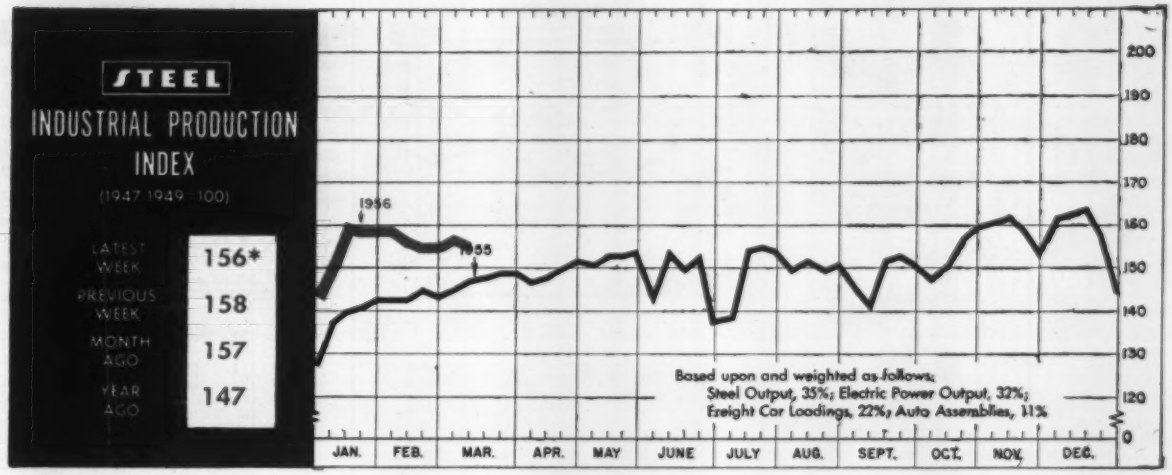
Let Timken Company metallurgists help you solve your tubing problems. *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Chlorination apparatus purifies extracted non-metallic residues to determine steel cleanliness. It's another of the many aspects of high temperature steel research in constant progress at the Timken Company.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



*Week ended Mar. 10

Extra Consumer Dollars Spur Business

ONE GOOD REASON business will stay up this year is because people have more money to spend than ever before, and it looks like they are willing to spend it.

According to Commerce department's Office of Business Economics, personal income in January was at an annual rate of $312.5 billion. With a population of 166,738,000, that's $1874 annually for every man, woman and child in the country. In January last year, per capita income, on an annual basis, was only $1782. The year-to-year increase is about 5.1 per cent. In the same period, the cost of living, as measured by the Bureau of Labor Statistics' consumer price index, has advanced only about two-tenths of 1 per cent.

Down a Bit—The January rate is down $2.5 billion from the December rate, which was beefed up by unusually heavy dividend payments. Personal income probably will slide somewhat in February because of further cutbacks in the automotive and allied industries and the elimination of some overtime in others. But consumer prices are not expected to gain in that time because of the softness in nondurable goods, especially groceries. So there still will be more money to spend. The only question is: Will the consumers spend it?

The answer seems to be yes. The automotive industry is pointing to February sales as an indication that the spring spending spree is just around the corner. With the aid of pepped-up sales in the last half of the month, February came out with total sales of about 513,000 units, or 6 per cent better than January's, says *Ward's Automotive Reports*. The industry is pointing to between 570,000 and 590,000 new car sales for March, compared with 698,000 last year.

Easter Parade—The way retail stores have been ringing the cash register this year, the consumer seems bent on sinking the extra money into clothes, furniture and other household items. For the

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,433[1]	2,462	2,273
Electric Power Distributed (million kw-hr)	11,200[1]	11,199	9,726
Bitum. Coal Output (1000 tons)	9,885[1]	9,970	7,780
Petroleum Production (daily avg—1000 bbl)	7,100[1]	7,146	6,845
Construction Volume (*ENR*—millions)	$413.8	$355.7	$358.2
Auto, Truck Output, U. S., Canada (*Ward's*)	166,239	167,422	204,285
TRADE			
Freight Car Loadings (1000 cars)	700[1]	711	667
Business Failures (Dun & Bradstreet)	275[1]	293	257
Currency in Circulation (millions)[3]	$30,202	$30,180	$29,816
Dept. Store Sales (changes from year ago)[3]	+6%	+4%	+15%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,025	$21,714	$19,531
Federal Gross Debt (billions)	$280.0	$280.0	$278.1
Bond Volume, NYSE (millions)	$25.6	$19.6	$19.0
Stocks Sales, NYSE (thousands of shares)	14,178	14,177	16,211
Loans and Investments (billions)[4]	$84.2	$84.0	$84.4
U. S. Govt. Obligations Held (billions)[4]	$28.3	$28.4	$34.6
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	277.5	276.9	227.3
All Commodities[7]	112.2	112.1	110.1
Commodities Other Than Farm & Foods[7]	120.4	120.4	115.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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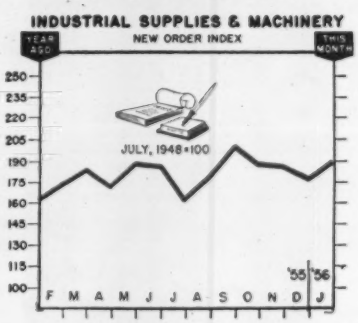
THE BUSINESS TREND



	1956	1955	1954
Jan.	192.7	164.4	139.8
Feb.	....	175.1	140.5
Mar.	....	186.9	141.5
Apr.	....	173.7	131.9
May	....	191.6	129.4
June	....	189.1	136.4
July	....	163.7	119.4
Aug.	....	181.2	132.5
Sept.	....	203.2	148.1
Oct.	....	190.0	136.3
Nov.	....	189.7	146.2
Dec.	....	180.0	148.8

Amer. Supply & Machinery Mfrs.' Assn.

	New Orders*		Sales*	
	1955	1954	1955	1954
Jan.	12,142	9,376	11,850	11,381
Feb.	12,170	9,394	12,029	11,248
Mar.	13,353	9,585	12,860	11,303
Apr.	12,879	9,619	12,805	11,160
May	14,331	9,588	13,322	11,066
June	14,033	9,822	13,527	11,293
July	13,571	9,407	13,503	11,153
Aug.	15,145	9,756	13,745	10,907
Sept.	14,936	11,153	13,692	10,832
Oct.	14,094	10,790	13,261	10,295
Nov.	14,680	10,491	13,721	11,314
Dec.	15,598†	11,963	13,659†	11,570

*Seasonally adjusted. †Preliminary
U. S. Office of Business Economics

Charts copyrighted, 1956, STEEL

week ended Mar. 3, department store sales held a 6-per-cent edge over the corresponding year-ago period. The advantage for the year to date is 3 per cent. Merchants are getting set for what they believe will be one of the biggest Easter rushes on record.

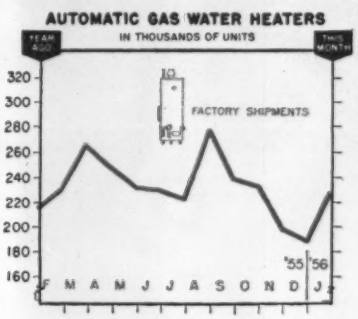
Appliance makers, too, believe people are willing to part with their cash. Philco Corp. says its spring appliance production schedules are running 40 to 60 per cent ahead of 1955's to meet heavy orders from distributors and dealers. General Electric Co. is hiring another 1000 workers this month and next for its Syracuse plant. Stepped-up schedules in television receiver production and military and commercial electronics equipment make the move necessary. J. P. Wright, president of Florence Stove Co., Chicago, believes sales of gas ranges and space heaters this year will outrun 1955's.

Industry Will Do Its Share

As for industry itself, spending is the keynote in keeping this year's business at a high pitch. In the fourth quarter, manufacturers told the Commerce department they plan to spend $3113 million for new plant and equipment in the first quarter. Record earnings in the fourth quarter and for the full year spurred these plans. In addition, commercial and industrial loans have indicated heavy industrial spending. The Board of Governors of the Federal Reserve System reports that such loans from reporting members increased $91 million for the week ended Feb. 29. Biggest increase was $60 million to manufacturers of metals and metal products.

Auto Production Firms Up

The auto industry—to many the biggest factor in a spring upturn—showed signs of firming up last week. Chrysler Corp. recalled 4700 hourly workers to handle the increased production schedules that went into effect Mar. 14 at its Plymouth Division. While the inventory of new cars at the dealer level is still at unprecedented levels, Detroit is gaging its production according to sales. The February upturn on the retail end of the business probably will have its effect on production of other makers, too. Output of cars and trucks for the week ended Mar. 10 totaled 158,118 units, compared with 157,532 for the previous week. Packard Division of Stude-

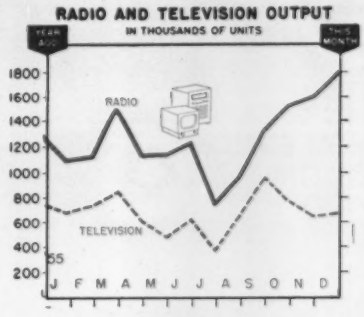


Shipments—Units

	1956	1955	1954
Jan.	226,700*	210,900	164,400
Feb.	.....	228,400	175,000
Mar.	.....	263,100	187,800
Apr.	.....	245,200	200,800
May	.....	229,400	195,600
June	.....	227,100	206,700
July	.....	219,300	190,300
Aug.	.....	275,600	207,100
Sept.	.....	237,100	205,500
Oct.	.....	231,200	202,000
Nov.	.....	195,500	179,100
Dec.	.....	185,400	166,800
Total	.....	2,748,200	2,281,100

*Preliminary

Gas Appliance Mfrs. Assn.



	Radio		Television	
	1955	1954	1955	1954
Jan.	1,068	872	655	421
Feb.	1,090	769	703	427
Mar.	1,482	940	831	600
Apr.	1,100	745	583	458
May	1,114	722	467	396
June	1,205	838	590	544
July	718	438	344	307
Aug.	948	785	648	633
Sept.	1,302	932	940	948
Oct.	1,500	998	760	921
Nov.	1,581	1,099	632	859
Dec.	1,786	1,262	605	833
Total	14,895	10,400	7,757	7,347

Radio-Electronics-Television Mfrs. Assn.

baker-Packard Corp. made the difference as it returned to production after a month's layoff.

Construction Sets Records

Heavy construction shows no signs of a letup despite the abnormally high rate of activity so far this year. F. W. Dodge Corp. reports that at least eight new records were set by February totals for the 37 eastern states. The month's total of $1,859,737,000 was up 18 per cent over February, 1955, and the first two months set a record of $3,717,965,000, about 21 per cent ahead of the like period last year. All three of Dodge's major classifications set new records for monthly and cumulative totals.

Engineering News-Record says its February figure of $1781.2 million for heavy construction awards bettered the record of January by 12 per cent. The total is 64 per cent better than February, 1955. And the two-month total to date is better than the corresponding 1955 period by 42 per cent. Contracts awarded during the week ended Mar. 8 amounted to $413.8 million, about average for the year. For the first ten weeks of 1956, industrial contracts are more than double the year-ago volume.

Steel Mills Hit 100 Per Cent

Production of the nation's steel mills came close to setting a new record for the week ended Mar. 11 with 2,462,000 tons of steel for ingots and castings. That's 100 per cent of weekly capacity, reports American Iron & Steel Institute. The record is 2,472,000 tons (set in the week ended Jan. 22). Operations for the week ended Mar. 18 were estimated at 2,433,000 tons by AISI.

The reason for such high steel operations in the face of reduced automotive requirements was pretty well summed up by Henry H. Heimann, executive vice president of National Association of Credit Men, when he said: "Other steel needs and usages can largely offset the reduced automobile needs. Highways, home repairs, schools, equipment, trucks, plants, the oil and railroad industries and a variety of local needs require steel. It is also well to remember that new products call for new equipment, new plants and new machinery. We are developing new products at so rapid a pace that it does not seem possible there could be a serious letup in steel production in the immediate future."

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THIN STRIP

±.0004″ is run-of-the-mill

Typical of the care that assures absolute uniformity in all Somers THIN STRIP is this 4-high mill equipped with the latest electronic gages and controls. Here thickness is constantly checked throughout the run, and maintained within ±.0004″ or less on gages from .010″ down. The slightest variation may be instantly corrected.

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Somers Brass Company specializes in rolling nickel and its alloys from .020″, and copper and its alloys from .012″ both down to .00075″.

If you now have, or anticipate, a problem with exacting standards of this strip metal write:

FOR EXACTING STANDARDS ONLY
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37% cost saving in production, 28% saving on assembly with Tinnerman SPEED NUTS®!

It takes only 5 Tinnerman SPEED NUTS to cut costs on the Atlas-Aire Utility Fan, manufactured by the Atlas Tool and Manufacturing Company, St. Louis.

Two "J" Type SPEED NUTS make a lightning-fast, vibrationproof attachment of carrying handle to fan housing. Three Push-On SPEED NUTS firmly secure the grill to the housing.

Twelve parts were eliminated to bring about a 37% cost saving; total assembly time has been reduced from 25 to 18 minutes to effect a 28% time saving. The elimination of a spot welding operation and a punch press also resulted in a better use of over 400 square feet of floor space!

Your Tinnerman representative can offer you over 8,000 different shapes and sizes of SPEED NUT brand fasteners to produce similar fastening savings in your product assemblies. Call him, or write for your free copy of "SPEED NUT Savings Stories."

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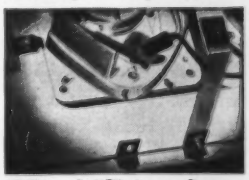
Canada: Dominion Fasteners, Limited, Hamilton, Ontario. *Great Britain:* Simmonds Aerocessories, Limited, Treforest, Wales. *France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine). *Germany:* Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

Jet-convector heater manufacturer uses "U" and "J" type SPEED NUTS, reduces assembly time by 50%.



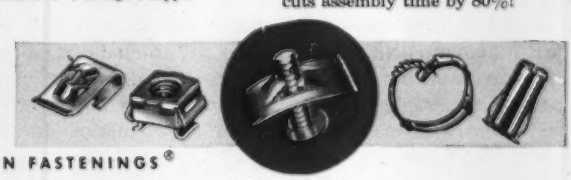
"U" and "J" type SPEED NUTS designed into new gas range gain 50% assembly time saving.

On this ceiling light, special SPEED NUT replaces 3 parts, cuts assembly time by 80%!

TINNERMAN

Speed Nuts

FASTEST THING IN FASTENINGS®



C. CLEMENT ENGLISH
. . . Universal-Cyclops sales post

C. Clement English was made manager of high temperature metal sales for **Universal-Cyclops Steel Corp.**, Bridgeville, Pa. He was district sales manager of the Dayton-Cincinnati territory.

William Bynum, executive vice president since 1951, was elected president of **Carrier Corp.**, Syracuse, N. Y. He succeeds **Cloud Wampler**, now chairman of the board and chief executive officer. **Robert C. White** was named chief product specialist, machinery and systems division, at Syracuse. He was senior sales engineer at Chicago.

Solar Steel Corp. appointed **Robert J. Wickes** sales manager of bar and tube products at its Cincinnati division, Sharonville, O.

Victor H. Bradford was made general manager, **Pratt & Letchworth Division**, Dayton Malleable Iron Co., in Buffalo. He succeeds the late **Keith Williams**. Mr. Bradford was sales manager. **Frank V. Herr** fills the new post of assistant general manager of the division and **Dennis J. Crowley** was named assistant sales manager, also a new post.

Aaron Schneier was made purchasing agent of **Circle Wire & Cable Corp.**, Maspeth, N. Y. He replaces **Melvin J. Furst** who has left the company.

R. G. DRAGAR
. . . York-Gillespie Mfg. chief engineer

R. G. Dragar was named chief engineer for **York-Gillespie Mfg. Co.**, Pittsburgh. He was chief draftsman for Mackintosh-Hemphill Co. and Atlas Steels Ltd.

John E. Barbier, manager of the thread tool division of **Jones & Lamson Machine Co.**, Springfield, Vt., fills a new post of manager of engineering. He is succeeded by **W. F. Couts.**

Andy L. Brown was elected president and general manager, **Calcor Corp.**, Los Angeles.

Warren J. Zeis joined **Planet Corp.**, Lansing, Mich., as chief engineer of its conveyor division. He succeeds **Robert E. Place** who was made manager, automation section. Mr. Zeis was chief engineer, Service Conveyor Co.

J. W. Anderson was elected vice president, **Union Chain & Mfg. Co.**, Sandusky, O.

E. D. Graham was made manager of manufacturing at **Gemmer Mfg. Co.**, Detroit. He was administrative executive of Ford Motor Co. of Canada.

John P. Roche was elected president of **Heppenstall Co.**, Pittsburgh, to succeed **R. B. Heppenstall** who was elected chairman. Mr. Roche was executive vice president.

V. J. PAZZETTI JR.
. . . gen. mgr. of Bethlehem Steel plant

V. J. Pazzetti Jr. was made general manager of the Bethlehem, Pa., plant of **Bethlehem Steel Co.** He succeeds the late **J. M. Sylvester.** Mr. Pazzetti was assistant general manager.

A. I. Davis was elected vice president and secretary of **Fort Duquesne Steel Co.**, Pittsburgh. He formerly was assistant to the president of Federated Steel Corp.

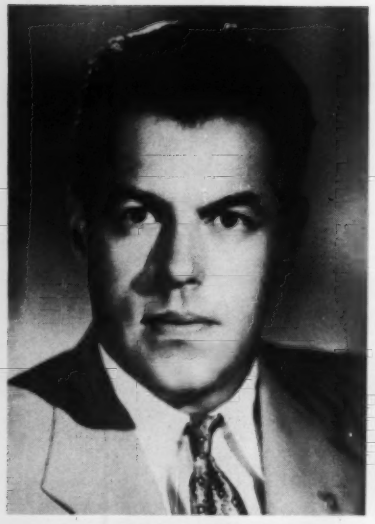
Frank J. Skwarek was elected a vice president of **Polarad Electronics Corp.**, Long Island City, N. Y.

O. H. Davol was made manager and **S. S. Blackmore** assistant manager in the general engineering department of **Electro Metallurgical Co.**, a division of Union Carbide & Carbon Corp. at Niagara Falls, N. Y. **H. M. Huse** was made consulting engineer.

Edgar C. Wallace was made chief metallurgist of the Watertown, N. Y., division of **New York Air Brake Co.** He was with Barber-Colman Co.

Warren J. Blanke was elected vice president, **Air-Way Industries Inc.**, Toledo, O. He joined the firm in May as director of sales.

Paul Hafer was appointed superintendent of the Great Lakes regional plant of **Federal Pacific**



LLOYD A. AMOS

A. F. GARCIA

. . . works managers of Kaiser Aluminum & Chemical plants

Electric Co., Cleveland. He was vice president-engineering with Continental Electric Equipment Co.

Skinner Chuck Co. and **Skinner Electric Valve Division**, New Britain, Conn., appointed **George Goepfrich** director of engineering and development and **Robert B. Clay** chief engineer of the electric valve division.

William A. Hopkins, vice president of **Bart Mfg. Corp.**, Belleville, N. Y., was appointed general manager of the Bart Lectro-Clad Division. Vice president of manufacturing since 1953, he will also direct marketing and sales functions for the Lectro-Clad division.

Cramer W. LaPierre was elected an executive vice president of **General Electric Co.** He continues direction of the electronic, atomic and defense systems group, with headquarters at New York. **Charles R. Pritchard** of Bridgeport, Conn., was elected a vice president. He continues as general manager, General Electric Supply Co. Division.

A. C. Meixner was named sales manager of **Westinghouse Electric Corp.'s** transportation and generator division, East Pittsburgh, Pa. He succeeds **J. B. Walker**, now sales manager of apparatus products at Pittsburgh.

John D. Sheley was named plant manager of the Watertown, N. Y., division of **Black-Clawson Co.**

Lloyd A. Amos was appointed works manager of **Kaiser Aluminum & Chemical Corp.'s** new plants at Ravenswood, W. Va. He is replaced as works manager of the firm's reduction plant at Mead, Wash., by **A. F. Garcia.**

Alvin W. Keeshan was elected vice president and chief engineer of **Modern Engraving & Machine Co.**, Hillside, N. J. He was manager and chief engineer with American Type Founders Inc.

R. T. Whitzel was made general production manager of **Aluminum Co. of America**, Pittsburgh. He is succeeded as general manager of the smelting division by **John D. Harper.**

At the Muncy, Pa., wire rope division plant of **Jones & Laughlin Steel Corp.**, **Grant H. Carpenter**, chief metallurgist, was promoted to assistant to the plant manager. **C. T. Evenden** was made chief service engineer and **W. H. Myers**, metallurgist.

Kaydon Engineering Corp., Muskegon, Mich., appointed **David C. Maxwell** assistant sales manager, needle roller division. He was director of sales with American Electric Fusion Corp.

Francis I. LeVeque was named a vice president of **Anchor Steel & Conveyor Co.**, Dearborn, Mich. He continues as secretary-treasurer.

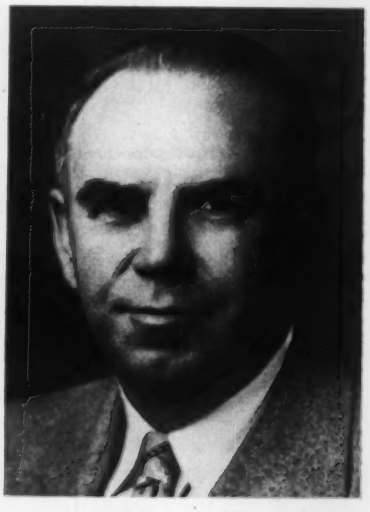
Frank M. Daughety was elected vice president-treasurer of **Peter A. Frasse & Co. Inc.**, New York.

Eric G. Boehm was made general manager, hydraulics division, **Houdaille Industries Inc.**, Buffalo. He has been connected with the management of its plants at Decatur and North Chicago, Ill., and Detroit.

Meyer Rosen was elected a vice president of **United States Air Conditioning Corp.**, Minneapolis. He will be in charge of the Floral City Heater Division in Monroe, Mich.

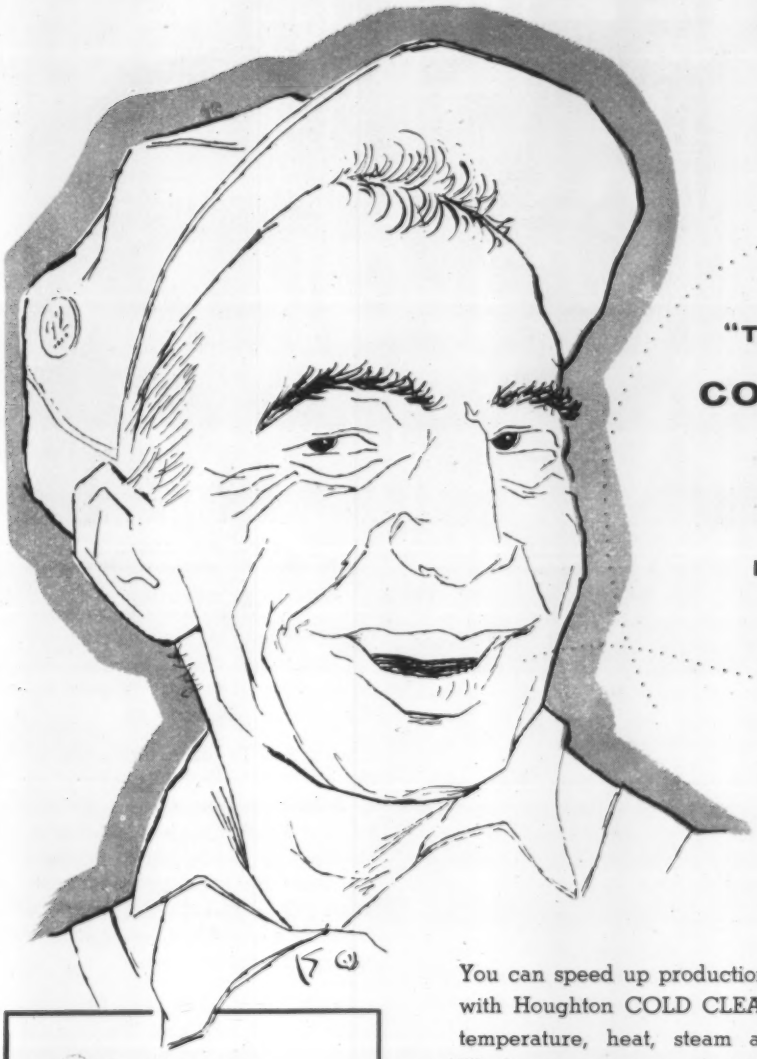
National Supply Co., Pittsburgh, appointed **James S. Blair Jr.** sales

R. T. WHITZEL



JOHN D. HARPER

. . . appointments at Aluminum Co. of America



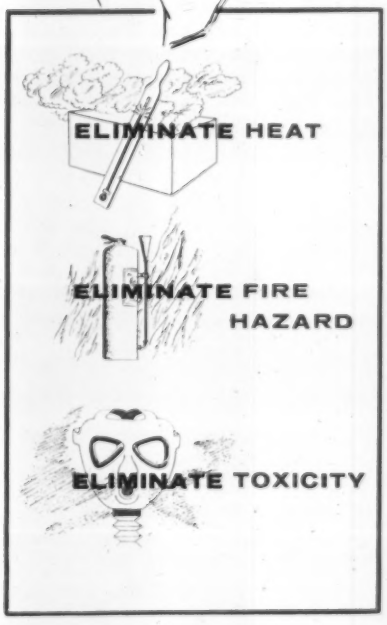
"THOSE HOUGHTON

COLD CLEANERS

SURE TAKE THE

MISERY OUT OF

METAL CLEANING"



You can speed up production and raise morale in the cleaning room with Houghton COLD CLEANERS. Because they are used at room temperature, heat, steam and dangerous fumes are eliminated. Workers are more comfortable—cool parts are more easily handled.

But that isn't all you gain. COLD CLEANERS do a faster, better cleaning job at less cost. There is no fire hazard. Costly heating equipment and high fuel bills are things of the past.

Prove the value of Houghton COLD CLEANERS in your own plant. Call the Houghton Man for a test, or write direct to E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

THE HOUGHTO-CLEAN LINE...

Emulsion, Acid, Alkaline and Detergent-type Cleaners for every industrial need

...products of

E. F. HOUGHTON & CO.

PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

Ready to give you on-the-job service . . .

WILLIAM P. DOWNEY
. . . heads Hyster-Straddle Truck Div.

CHARLES L. HOLBERT
. . . H. K. Porter Company v. p.

GORDON F. SIMONS
. . . Beryllium dir., engineering-development

manager, drilling equipment, to succeed **W. T. Cushing,** now manager of industrial sales, a newly created post.

William P. Downey was made supervising engineer of **Hyster Co.'s** Straddle Truck Division, Portland, Oreg. He succeeds **H. Noel Dimick,** retired.

Chromalloy Corp., White Plains, N. Y., appointed **Daniel E. Lehane** manager of sales engineering. He was sales engineer in the New York office of Standard Steel Works Division, Baldwin-Lima-Hamilton Corp.

Globe Iron Co., Jackson, O., elected **Winston Pfancuff** vice president in addition to his duties as secretary.

Paul E. Noll was made assistant to the vice president-sales, **Columbia-Geneva Steel Division,** U. S. Steel Corp., San Francisco. He was director of research and development for Consolidated Western Steel Division at Maywood, Calif.

Charles L. Holbert was elected a vice president of **H. K. Porter Company Inc.** He is in the general offices in Pittsburgh. He was executive vice president, Southern Pacific Milling Co.

Follansbee Steel Corp., Pittsburgh, elected **Irving J. Berkman** executive vice president and **Dewey O. Olson** vice president in charge of mill operations.

Wheeling Steel Corp., Wheeling, W. Va., appointed **T. S. O'Konski** general manager of factories and **R. L. Jolly** general manager, Wheeling and Steelcrete factories. **E. G. Crouser** was made chief production engineer, Wheeling factory.

William B. Gillespie was made sales manager of **Fayette R. Plumb Inc., Delta File Works Inc.** and **Grahm Rotary File & Tool Corp.,** all in Philadelphia. He formerly was sales manager of the hardware and tool division of Henry Disston Division, H. K. Porter Company Inc.

Gordon F. Simons was made director of engineering and development for **Beryllium Corp.,** Reading, Pa. Since July, 1954, Mr. Simons has been works manager.

Atkins Saw Division, Borg-Warner Corp., Indianapolis, appointed **B. L. Owens** director of sales. He was general sales manager. **James E. Butler** was made sales manager for both the industrial and hardware sales divisions and **Joseph J. Sweeney** was made director of marketing for the divisions.

Howard M. Givens Jr., formerly manager of tool and high speed steel sales for Crucible Steel Co. of America, joined **Braeburn Alloy Steel Corp.,** Braeburn, Pa., as assistant to the president.

J. S. Couzens was made sales manager of **H & H Tube & Mfg. Co.,** Detroit.

Harold C. Erskine succeeds **Allen B. Norton,** retired, as general manager, castings division, **Aluminum Co. of America,** Pittsburgh.

OBITUARIES . . .

Robert A. Horner, 66, who retired last December as division manager, machine and small tool division, **Barber-Colman Co.,** Rockford, Ill., died Feb. 28.

John R. McMahon, 52, purchasing agent for **Pullman Standard Car Mfg. Co.,** died Feb. 29 in Meridian, Pa.

Albert L. Smith, 57, vice president of **Continental Copper & Steel Industries Inc.** and general manager of its Walsh Portland Division, South Portland, Me., died Mar. 1.

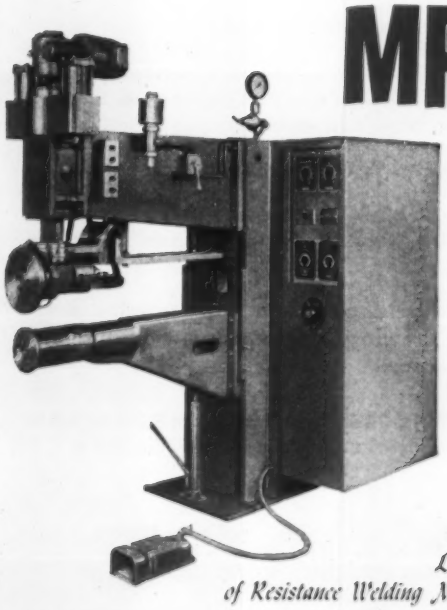
Ian R. Sutherland, plant superintendent, **Cleveland Pneumatic Tool Co.,** Cleveland, died Mar. 4.

Gilbert E. Kempka, 28, chief metallurgist of **Johnson Motors,** Waukegan, Wis., died Mar. 3.

Joseph Huska, 61, treasurer, **Paragon Die Casting Co.,** Chicago, died Mar. 1.

FOR THE FIRST TIME A COMPLETELY NEW DESIGN OF SMALL, LOW PRICE SCIAKY SEAM WELDERS

Featuring all the Ruggedness, Dependability and Consistency of Operation Common to Sciaky Basic Thinking—Welders Designed to Do More Useful Work at Lower Operating Cost with Maximum Reliability!



MP-2 AIR OPERATED, PRESS TYPE, LOW IMPEDANCE, SINGLE PHASE SEAM WELDER

Through advanced design, volume production tooling and complete use of integrated parts, Sciaky has been able to add a seam welder to its line of competitively priced, small, standard welders. Check these important design features . . .

Pneumatic Double-Acting Cylinder Head
Low Inertia, Anti-Friction Bearing Guided Ram
Side Mounted Sciaky Integral Control
Low Impedance Secondary Circuit
Sciaky High Efficiency Welding Transformer
Copper Alloy, Fully Adjustable Lower Arm
Silver Plated, Laminated Flexible Shunt Conductor
Simple, Positive Internal Gear Drive

For complete details and specifications on the MP-1 seam welder write for Bulletin 321-7.

Largest Manufacturers of Resistance Welding Machines in the World

SCIAKY®

SCIAKY BROS., INC. • 4909 W. 67th STREET • CHICAGO 38, ILLINOIS

Engineered and Built by Dodge
for High Quality at a Moderate Price —

SCM
FOR MEDIUM DUTY
30,000 HOUR LINE

SC
FOR NORMAL DUTY
30,000 HOUR LINE

The Seal *Won't Blow!*

- Fully self-aligning.
- Rugged one-piece housing.
- Fully assembled and pre-lubricated at the factory.
- Sealed both on and off the shaft.
- Metallic backed synthetic rubber seals keep lubricant in, dust and dirt out. Engineered to stay put—*the seal won't blow!*
- Pillow block and flange cartridge types.
- Available from distributor stocks—SC in shaft sizes from 3/4" to 2-7/16"; SCM from 1-7/16" to 3-7/16".
- Write for bulletin complete with tabular data, engineering drawings, dimensions, weights, and radial load ratings.

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION
4400 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

Production of Rare Earths Climbs

Crane Co., Vitro Corp., Davison Chemical Co. and Metallurgical Resources Inc. are spending millions of dollars to expand strategic metal processing facilities

TECHNOLOGICAL advances and the prospects of even greater ones immediately ahead have stimulated interest in rare earths and strategic metals. Several companies have stepped up their activities and plan to enlarge production facilities.

Crane Co., Chicago, and Vitro Corp. of America, New York, have a joint operation to produce thorium, rare earths and heavy minerals from monazite, as well as rutile, ilmenite, zircon and kyanite. They will assume equal ownership of Heavy Minerals Co., its mining subsidiary (Marine Minerals Inc.) and associated operations. By the end of this year, the combined investment in this operation will approximate $6 million. A subsidiary of the French chemical group of Pechiney continues to hold a minority interest.

Growing — Heavy Minerals Co. will build facilities near Chattanooga, Tenn., for processing monazite and other products.

Marine Minerals, located near Aiken, S. C., is mining rutile for sale as a raw material for the production of titanium; ilmenite for sale as a raw material in the production of titanium pigments; zircon for sale and processing by Heavy Minerals; and monazite, which will be processed by Heavy Minerals.

An associated operation has developed minable areas along the Gulf Coast between Panama City and Pensacola, Fla. It will dredge mine a mineral concentrate which will be separated principally into rutile, ilmenite, zircon and kyanite. Facilities will be built near Panama City for these purposes.

Prices Cut — Davison Chemical Co. Division of W. R. Grace & Co., Baltimore, and its affiliate, Rare Earths Inc., offer in substantial quantity heavy rare earth oxides in purities up to 99.9 per cent and at prices below what has been the market scale. Oxides offered, with prices per gram, are:

Yttrium	$1
Samarium	$2
Gadolinium	$2
Ytterbium	$8
Dysprosium	$10
Erbium	$40
Thulium	$160

These oxides are derived by the new ion-exchange process from rare earth concentrates stockpiled over a number of years by the company at its Pompton Plains, N. J., plant. The announcement reflects the plans of both companies for constant expansion in every phase of the rare earth industry.

A new plant is being built at Davison's Curtis Bay (Baltimore) Works at a cost of $2 million. Rare earths and thorium will be derived from monazite sands.

Metallurgical Resources Inc., New York, will establish a strategic metal processing plant in Newburgh, N. Y. It will be the pilot installation of a new process to extract greater quantities of rare and strategic metals (cobalt, columbium, tantalum, chromium, nickel) than previously was possible from complex ores.

Sill Process—Metallurgical Resources Inc. was formed recently to develop and exploit the process invented by Dr. Harley Sill of Los Angeles. This process treats complex ores containing arsenic and sulphur.

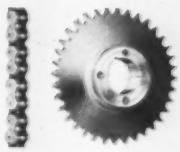
Previous methods of removing arsenic and sulphur from concentrates containing cobalt required smelting of the ore and frequently left as much as 20 per cent of the arsenic and sulphur in the treated concentrates. The Sill process, without smelting, permits the reduction of the arsenic and sulphur contents of the concentrates to 2 per cent or less. This is done by autoclaving and a unique leaching process.

(*Please turn to page* 74)

DODGE PRODUCTS *you should know*

FLEXIDYNE
THE DRY FLUID DRIVE

TAPER-LOCK
SHEAVES



TAPER-LOCK
SPROCKETS AND
DODGE ROLLER CHAIN

DODGE BULLETINS YOU SHOULD HAVE

- FLEXIDYNE Dry Fluid Drives and Couplings. Complete story, technical information and selection data. Bulletin A-640-A.
- TAPER-LOCK Sprockets, Chain Couplings and Dodge Roller Chain. Technical information — selection, installation and maintenance data. Bulletin A-644.

Write for your copies.

DODGE MANUFACTURING CORPORATION
4400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

BEE'S IDEA of good housekeeping—frames for honeycomb boxes are neatly spaced with CF&I-Wickwire Tinned Finish Bee Wire.

CF&I—WICKWIRE MAKES WIRE FOR THOUSANDS OF USES

VERTICAL TRAFFIC in buildings moves up and down safely and smoothly on elevator cables made of CF&I-Wickwire Rope Wire.

to support everything from a honeycomb to a freight elevator . . . count on wire

An amazing number of widely varying needs for wire is encountered every day. The reason wire can be used so many different ways and for so many different purposes is because properties to suit almost any set of specifications can be built into the wire itself. Whatever your wire requirements—from rope wire of tremendous strength to easily-bent floral wire—your needs can be answered to your complete satisfaction. And CF&I-WICKWIRE, offering over a century of experience and complete wire-drawing and forming facilities, can provide exactly the wire you need.

You'll like doing business with CF&I-WICKWIRE and the particular attention given your own specific requirements. And you'll like the prompt service you get from CF&I-Wickwire Plants conveniently located from coast to coast. For detailed information, write our nearest district sales office.

"KEEP OUT" signs for insects. Screen cloth woven from CF&I-Wickwire Weaving Wire provides lasting protection against all kinds of flying insects.

HOLD UP. Flowers don't wilt or droop when CF&I-Wickwire Florist Wire is used in making floral designs and corsages.

WIRE SKELETON for new roads gives them greater strength and longer life. Here welded wire fabric is being laid down. Fabric is made of CF&I-Wickwire Industrial Quality Basic Wire.

JOINED FOR LIFE. Special CF&I-Wickwire Welding Wire is used for gas and electric welding.

CF&I—WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver
El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

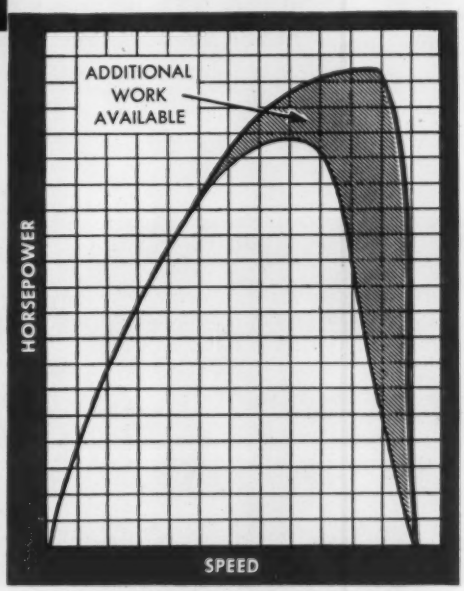
CF&I

3146

BUCKEYE X-4 ABRASIVE TOOLS

extra power...
same light weight...
greater efficiency...
MORE WORK PER TOOL!

here's proof BUCKEYE X-4 tools deliver extra work



(for even better proof, put an X-4 on your job and get that extra work!)

Look up the toughest metal removal job in your plant, maybe a job that's been fouling up your production schedule for some time. Put a new Buckeye X-4 tool on that job—and stand back!

What happened to the tough job? Why, it's all finished—just like that! And the tool operator's surprised grin lets you know he's never used a tool like this before . . . a tool that whips a tough job quick and easy. With Buckeye X-4 abrasive tools working for you, you'll grin, too—every time you look at that production schedule!

Complete information on these all-new, bright-red Buckeye X-4 abrasive tools will be found in our new Catalog A-10. We'll be glad to send you a copy . . . just tell us where and to whom.

You can get X-4 performance from your present Buckeye D, E and F Series grinders, buffers and sanders. Just tell us code names and serial numbers of tools you are now operating and we'll tell you how.

Buckeye Tools CORPORATION
DIVISION 12 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

(*Concluded from page 71*)

Arsenic and sulphur are separated from the copper, cobalt and other valuable constituents of the ore. The metals recovered are practically chemically pure.

Alan Wood To Build Plant

Alan Wood Steel Co., Conshohocken, Pa., will build a $2-million plant at Oaks, Pa., for its Penco Metal Products Division. The facility, scheduled to be completed in early 1957, will make steel lockers, cabinets and shelving. An additional $450,000 will be spent for new equipment and for moving equipment from the Penco plant in Philadelphia.

Predicts Zirconium Price Cut

Firth Sterling Inc., Pittsburgh, is increasing its capacity for vacuum melting of reactor grade zirconium sponge. It is installing a consumable electrode furnace, which melts under argon-helium or vacuum at its Trafford, Pa., plant. The facility will more than double capacity and will produce zirconium ingots up to 2000 lb. K. D. Mann, president, says zirconium sponge "will be available at much lower prices and in greater volume by the middle of 1957."

Specializes in Plate Work

Brown Steel Supply Corp., Los Angeles, changed its name to CPS Steel Corp. It will specialize in plate fabrication. The firm will install a Cincinnati 12-ft shear and flame cutting equipment.

Feedall Builds Plant Addition

Feedall Inc., Willoughby, O., completed another addition to its factory, increasing manufacturing space about 35 per cent. This is the second expansion within 15 months. The firm makes automatic feeders.

Equipment Maker Doubles Plant

Circo Equipment Co., Clark (Rahway), N. J., is doubling the size of its plant at an estimated cost of $100,000. The firm makes metal washing and solvent degreasing equipment. Scheduled for com-

FIELD REPORT: NO. 90

WHICH DIE STEEL WOULD YOU USE HERE to get this punch out of hardening in one piece?

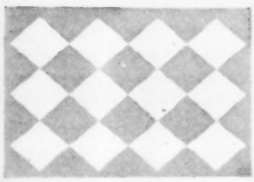
This punch blanks automotive stampings from SAE 1010 strip, .062" thick. It is so unbalanced in design that safety in hardening is vital in the die steel used. Since the punch is shear fitted to the die section before heat treating, accuracy in hardening is equally important. The punch is hardened to Rockwell C-61/62. All the steels tried either broke or changed size excessively.

If the decision were squarely in your lap, which die steel would you be willing to recommend?

Here's how the manufacturer solved the problem, as recorded in a Field Report from our customer: The Carpenter Matched Set Method showed that Carpenter VEGA (Air-Tough) Die Steel had the hardening safety and accuracy plus toughness demanded by the job. The punches are now coming through heat treatment "right on the nose," and production between grinds has jumped from about 10,000 to 50,000 parts. Further, the heat treater says VEGA is the easiest air-hardening steel he has ever worked with.

When the decision is up to you, rely on Carpenter for *dependable* results. For fast attention to your orders, call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor, today. *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

Your toolroom can use Carpenter Matched Tool and Die Steels to:



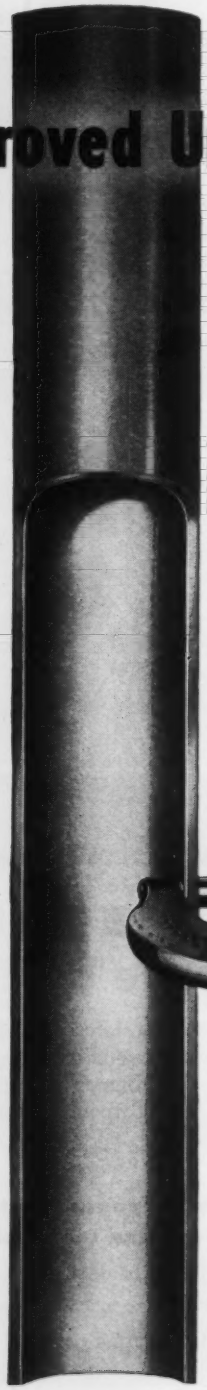
Reduce hardening hazards
Minimize machine downtime
Boost output per grind
Improve product quality

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks — Export Address: Port Washington, N. Y. — "CARSTEELCO"

Proved Under PUNISHMENT



STANDARD CYLINDER TUBING

"Mirror Finished" to precision tolerances, it's used in automobile shock absorbers, power steering, hydraulic pumps . . . without further sizing or finishing.

Here's a busy part of an automobile shock absorber that's built for brutal punishment. It's Standard's modern "mirror-finish" Cylinder Tube. So that it won't weaken or leak under punishment, every inch of this tubular "toughie" must measure up to exacting specifications—in cylinder finish . . . in I.D. tolerances as close as .001" . . . in extreme uniformity of wall thickness and concentricity . . . in internal pressure resistance, to shocks up to 9000 P.S.I. The elimination of broaching or further processing of any kind effect significant savings for our customers in product assembly.

As you see here, the engineering involved behind the application of tubing to your product is *more than skin deep at Standard.* Our engineers will gladly show you why in helping you with your tubular application—whether it involves a simple structural or mechanical member . . . or a precision application.

Send for 8-page folder on all Standard products or see Sweet's Design Catalog.

MAKE "STANDARD" YOUR SOURCE FOR—

- WELDED MECHANICAL TUBING
- WELDED STAINLESS TUBING
- BOILER AND HEAT EXCHANGER TUBING
- EXCLUSIVE "RIGIDIZED" PATTERNS

STEEL TUBING SIZES: ½" O. D. TO 5½" O. D. — .028 TO .260 WALL.
STAINLESS SIZES: ¼" O. D. TO 4½" O. D. — .020 TO .154 WALL.

pletion in June, the plant will be provided with additional machinery to streamline and speed fabrication and assembly.

Metalworking Firm Organized

California Industrial Processing Co., 5765 Meadow Rd., South Gate, Calif., has been formed to heat treat and finish metal parts.

Woodward Iron Expanding

Woodward Iron Co., Birmingham, will spend $8.7 million this year for expansion and development of its properties. Planned projects include: Construction of a sintering plant to process iron ore and flue dust; extension and development of the Mulga coal mine; replacement of power generating equipment; rehabilitation and development of the recently purchased Longview Lime Corp. properties at Saginaw, Ala.; development of iron ore reserves in the Wildwood area; acquisition of additional mineral resources.

Vickers Builds in Mississippi

Vickers Inc., Detroit, a division of Sperry-Rand Corp., is building a hydraulic controls manufacturing plant at Jackson, Miss. The company has leased 16,000 sq ft of space in the federal buildings at Jackson airport for temporary quarters. It will train workers and store equipment there until the new building is completed. Vickers makes hydraulic controls and drives for commercial, marine, aircraft and military installations.

Republic Enlarges Warehouses

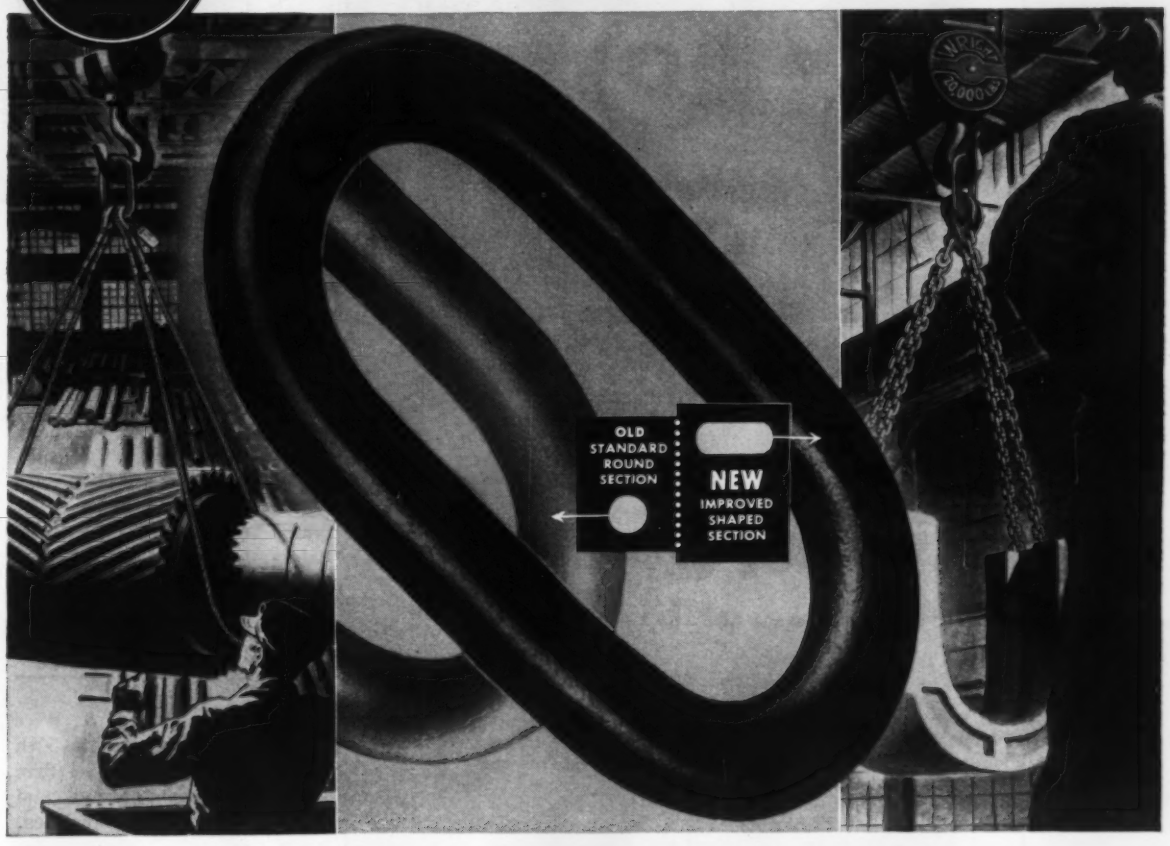
Detroit warehouse facilities for products of Republic Steel Corp.'s Berger and Truscon Steel divisions are being enlarged. Berger's line of steel equipment products (lockers, shelving and office furniture) will be expanded when the division (and its sales office) moves to a Republic warehouse at 237 Joseph Campau Ave. These products were stocked in Republic's warehouse at 7485 Central Ave.

Space released by the Berger move will enable the Truscon Steel Division to expand its line of building products. Warehousing space

ACCO products

ACCO Registered* Slings–Wire Rope & Chain

THE STANDARD OF EFFICIENCY AND SAFETY



An Extra Bonus of Safety for Slings—
THIS NEW SHAPED MASTER LINK

• ACCO's engineers found that if they shaped the master links for chain and wire rope slings as shown above, these new shaped links would hold their form under loads up to 18% greater than could the old standard round links. The reasons are similar to those which enable a shaped I-Beam to handle greater loads than could the same amount of steel if used as a solid beam.

The new link is smoother and provides a greater factor of safety. It is a better link in many ways. It costs us more to make. Yet it is offered at no increase in price.

"Registered*"—for Greater Safety

Development of this new link is just the latest step in ACCO's continuing program to provide the greatest possible measure of safety and reliability in ACCO *Registered* Slings.

Each component of an ACCO *Registered* Sling is made from the best materials procurable for its use. Each part must prove to have strength equal to or greater than the sling body. All hooks for ACCO *Registered* Slings are Magnaflux tested. Then these components are assembled into slings according to carefully engineered designs that have proved themselves in rigorous field tests.

The completed sling is then individually proof-tested to twice the working load limit for which it is rated. Then, and only then, is it awarded the coveted ACCO Registration Certificate and the identifying ring or tag.

See your Distributor

ACCO *Registered* Slings are readily available from a distributor near you. If you don't know him write to our Bridgeport office for his name.

*Trade Mark Registered

ACCO

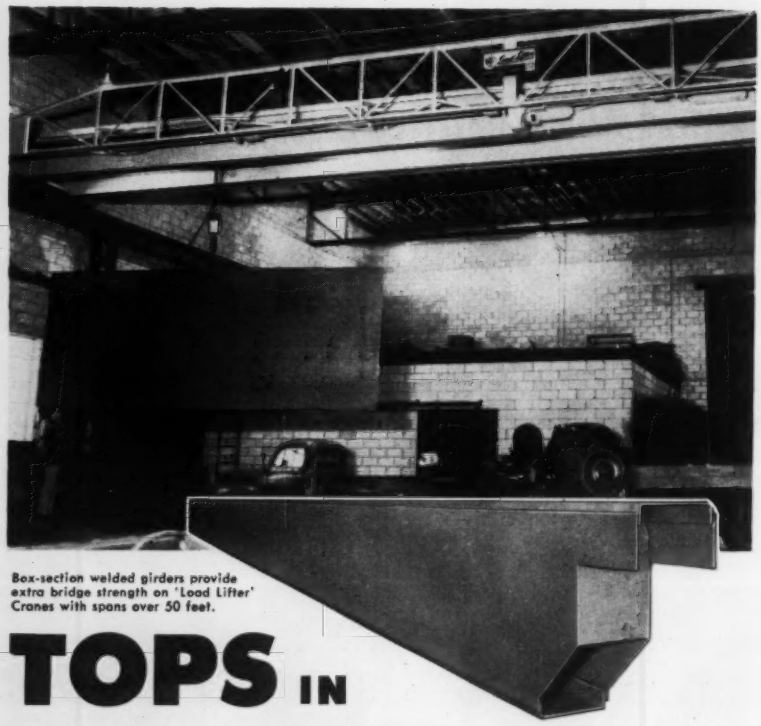
TRADE MARK

AMERICAN CHAIN & CABLE

BRIDGEPORT, CONN.

Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Wilkes-Barre, Pa., York, Pa.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Better Value



Box-section welded girders provide extra bridge strength on 'Load Lifter' Cranes with spans over 50 feet.

TOPS IN CRANE SERVICE AND ECONOMY...at low prices

Here you see a typical Series "D" All-Electric 'Load Lifter' Crane. This Series differs importantly from all other brands available for average industrial service. Standardization and mass production methods permit the inclusion of design and construction features not combined in the most expensive cranes. Day-to-day operating and maintenance costs are minimized. Equally important, the initial investment is substantially lower than for other makes for comparable service.

Provided in Series "D" Cranes are plus values like these:

- Every practical use of anti-friction bearings to retard wear, to assure smooth operation.
- All gearing operates in oil to keep maintenance low.
- Double braking system to make accurate spotting easy.
- Positive magnetic control: Floor-operated cranes controlled by push button; cage-controlled cranes by master switches.
- Comparatively low headroom and high hook lift.
- Three-girder bridge on spans under 50 feet and box-section welded girders on longer spans to insure against whipping and skewing.

Series "D" All-Electric 'Load Lifter' Cranes are built in capacities from 1 to 20 tons. All provide complete safety for man, load and crane. Selection is easy. No complicated figuring. Just write for Catalog 221 and make your choice.

MAXWELL MANNING M&M MOORE INC TRADE MARK

'Load Lifter'® CRANES

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

for tool steels and sales offices for these products will continue at the warehouse on Joseph Campau avenue. Products of the Union Drawn Steel Division no longer will be carried in that warehouse.

ASSOCIATIONS

Convector Manufacturers Association, Detroit, elected J. M. Whalen, president; R. S. Rickabaugh, vice president; R. E. O'Rourke, secretary-treasurer. Mr. Whalen is convector sales manager of Trane Co., La Crosse, Wis.; Mr. Rickabaugh, sales manager, Heating Products Division, Tuttle & Bailey Inc., New Britain, Conn.

G. R. Roden, manager of sales of engineering window products, Republic Steel Corp.'s Truscon Steel Division, Youngstown, was elected chairman of the board of directors, **Steel Window Institute,** Cheltenham, Pa.

ANNIVERSARIES

L. A. Young Spring & Wire Corp., Detroit, celebrated its 50th anniversary Mar. 14. The firm makes cushion seat springs and back spring units for automobiles; precision mechanical springs for automobile valves, brakes, clutches and similar components; hydraulic hoists and power tail gates for vehicles; steel dump truck bodies; hydraulic roadbuilding and industrial construction machinery; heavy-duty outdoor fork lift trucks. The firm uses 80,000 tons of steel annually.

NEW ADDRESSES

Colorado Fuel & Iron Corp. moved its district sales office and warehouse to larger quarters at 3838 W. 51st St., Chicago 32, Ill. District sales manager is L. J. Renner.

Veeder - Root Inc., Hartford, Conn., moved its district office to 12417 Cedar Road, Cleveland 6, O. L. S. Zack is district engineer.

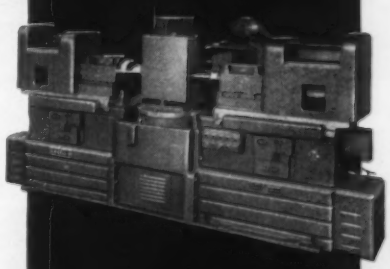
Modernize Today for Profits Tomorrow

WITH FAST, VERSATILE PRECISION WAY MACHINES

EX-CELL-O TWO-WAY: Operates from a single push-button station. Handles large, heavy work. Fixture section can be designed to accommodate the way units from any angle.

Units may be re-arranged around fixture or new fixture sections designed for different operations.

EX-CELL-O ONE-WAY: A standard way unit combined with a fixture unit to suit the work. Large, heavy, and awkward parts, loaded in the fixture, remain stationary; the spindles advance to the work.



EX-CELL-O THREE-WAY: Standard way units are electrically interlocked to operate simultaneously, or in any sequence. Fast and efficient for machining parts from three directions and holding accurate locations.

EX-CELL-O FOUR-WAY: Controlled from a central push-button station. Particularly suitable for machining parts from four directions simultaneously, and performing progressive operations.

55-50

EX-CELL-O

WAY TYPE PRECISION BORING MACHINES ARE PROFIT INSURANCE

Way Machines perform such operations as precision boring, turning and facing. They consist of one or more standard way units combined with a fixture section. Each way unit has its own hydraulic system and controls to operate the spindle slide. Tooling and fixture are added to suit the individual operation. Get details from your Ex-Cell-O representative or write for Way Machine Catalog.

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
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AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

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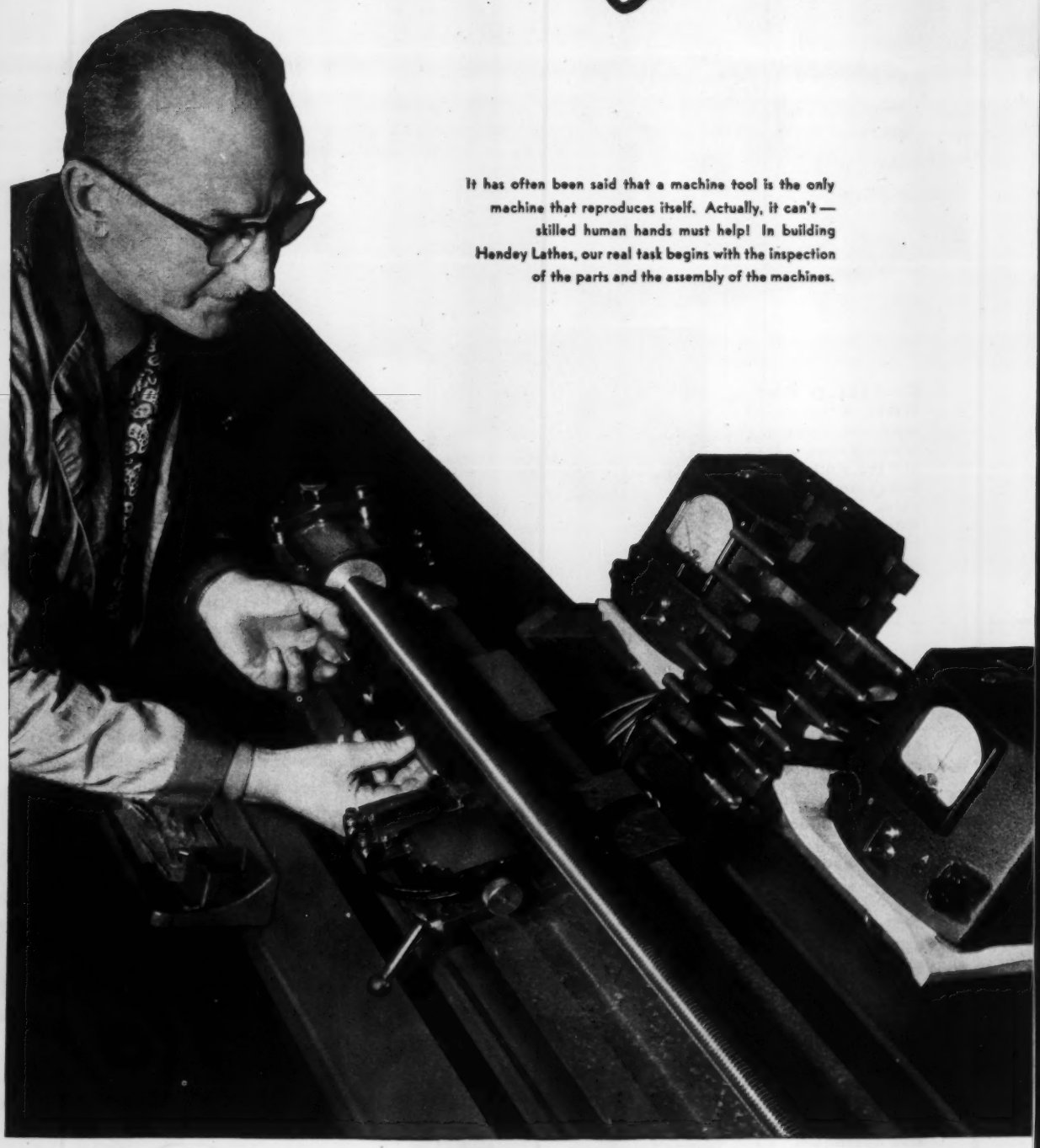
Something more



It has often been said that a machine tool is the only machine that reproduces itself. Actually, it can't — skilled human hands must help! In building Hendey Lathes, our real task begins with the inspection of the parts and the assembly of the machines.

than tolerances...

creates the enduring accuracy built into

every Hendey Lathe!

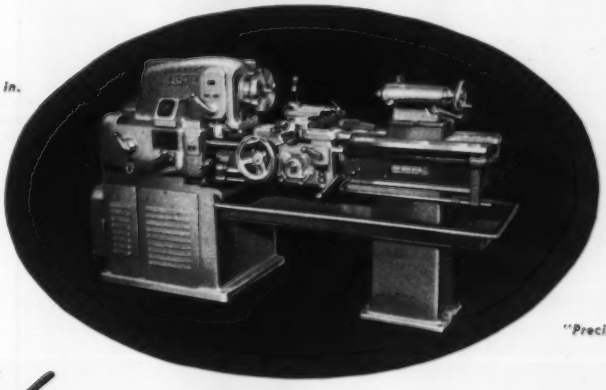
At the left you see one of our inspectors carefully checking a Hendey lead screw, assuring that it is within the prescribed tolerances. Every lead screw is cut to closest possible tolerances, and inspected with an electronic lead checker.

Every inch of every lead screw is checked with measuring rods and the special device shown. Two electronic gauges are used in this inspection — one to measure errors to within .0001 in., and the other to assure the operator that his setup remains the same from test to test. This method of inspection, re-enforced by the operator's desire for perfection, insures that lead screws are well within the lead tolerance over their entire length.

Our Model 2E General Purpose Lathe offers a fast, accurate method for cutting threads, as well as performing a variety of other toolroom operations. With a single, three-position lever on the apron, you can control the sequence of operations in thread cutting — starting, stopping, and reversing the tool through the thread without crossing it. For longer threads, half nuts and the thread chasing dial can be used.

For other operations, the Model 2E Electronic Drive gives you infinitely variable spindle speeds from 15 to 1500 rpm. On facing cuts, stepped diameters, and tapers, the operator can change speeds during the cut, selecting the correct rpm on the control rheostat. The belt drive provides smooth vibration-free power to the spindle for extra-fine finishes, and back gears are provided for heavier cuts. These and other Hendey features mean easier, low-cost production and faster "pay-off" on your investment. Write your Hendey dealer for complete facts!

Hendey No. 2E 14 in. General Purpose Lathe



"Precision with Production"

Hendey machine division

BARBER-COLMAN COMPANY

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A Nilson #2 Four-Slide Automatic Wire Forming Machine is being used by Rollash Corporation, Brooklyn, N. Y., to form wire as shown for their eyelash curler . . . complete in one operation. After one year's operation they report savings of—

40% on actual manufacturing costs
15% on improved tooling which eliminates secondary operations.
10% on fewer rejects, full parts control assuring top precision.
. . . elimination of freight charges by making parts on premises, advantage of immediate access to production.

TOTAL SAVINGS . . . OVER 65%

NILSON 4-SLIDES FEATURE

- One-man operation
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- Press sections 5 to 30 ton cap.
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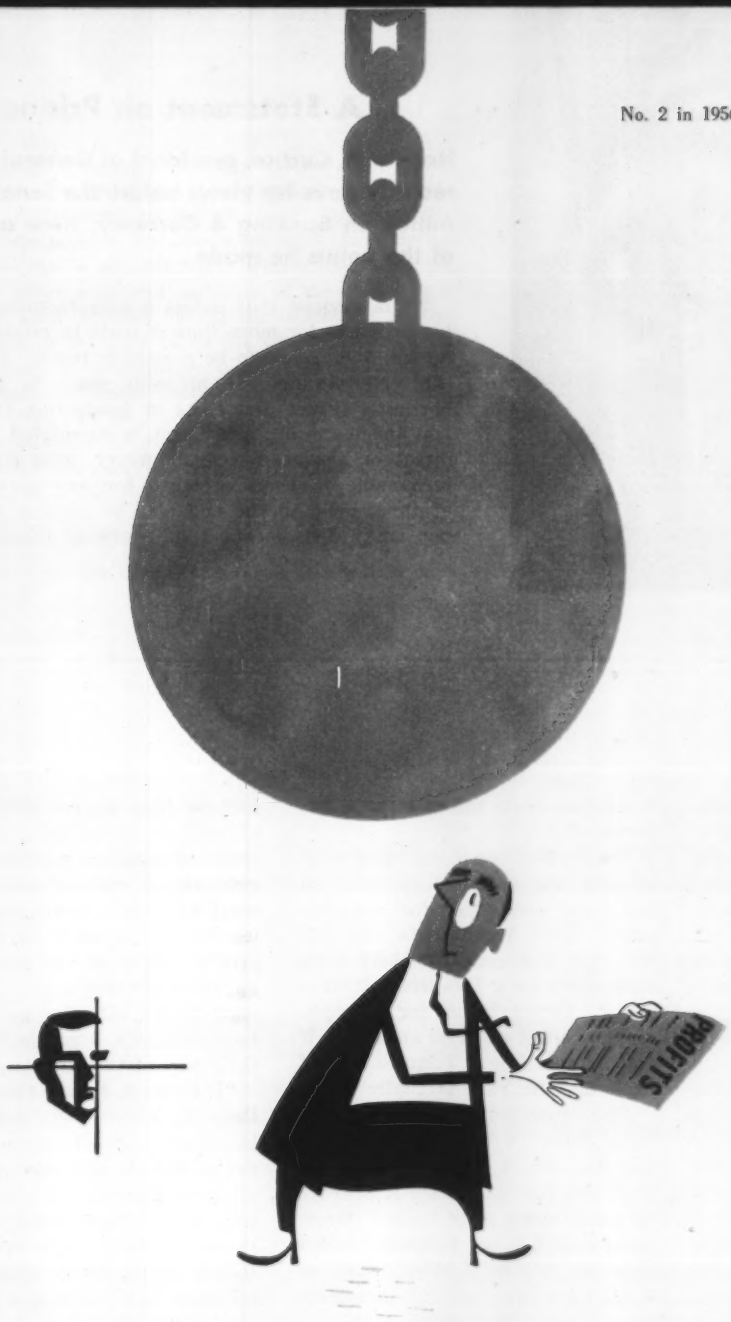
2

STEEL's 1956 Management Series . . .

The editors of STEEL herewith present the second in their ten-part series, Program for Management for 1956. The complete list:

1. **It's Time To Grow** (Feb. 13, p. 81)
2. **Know Your Costs** (Mar. 19, p. 83)
3. **Ideas for Industry** (Apr. 23)
4. **Metalworking Goes to Market** (May 14)
5. **Metalworking's New Horizons** (June 18)
6. **How To Live with SUB** (July 16)
7. **To Merge or Not To Merge** (Aug. 13)
8. **Motivating Men To Produce** (Sept. 24)
9. **Automation—Bogeyman or Bonanza** (Oct. 15)
10. **Industry and College—Partners in Development** (Nov. 12)

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*



Know Your Costs . . .

EMERSON Electric Mfg. Co. of St. Louis had something in common with many metalworking firms last year: It was trapped in the vise of rising costs and a competitive situation that held a tight rein on price increases. Companies in similar straits worried through a year of profitless prosperity, but not Emerson. It wrote its story of 1955 in black ink. The secret of its success can be summed up in three words: *Know your costs.*

Because it knew its costs, Emerson was able to engineer more than $2 million out of them last year. That sum virtually represents the amount of profit it realized for the period.

How did the company do it? A cost control force under the direction of President W. R. Persons detected two soft spots in the company's cost picture: Design and

A Statement on Pricing

Harlow H. Curtice, president of General Motors, recently gave his views before the Senate Committee on Banking & Currency. Here are some of the points he made . . .

"It is obvious that unless a manufacturer can sell his products for more than it costs to produce them, he will soon cease to be a manufacturer. Therefore, the determination of probable costs is most important. Direct unit costs of production (direct labor and material) must first be calculated. The indirect or overhead costs, however, even though determinable in the aggregate for any given period of time, must in the end also be reduced to a cost per unit. This means that overhead costs must be

manufacturing overhead. Products were redesigned. Working closely with operating management down to the foreman level, the cost control team set up budgeted goals aimed at reducing such overhead items as scrap, supplies and indirect labor. Savings achieved averaged from 15 to 17 per cent.

Challenge—The Emerson story shows what can be done to beat rising costs and stiff competition. If you know your costs, you can improve your profit by squeezing the water out of those costs that are under your control. But that's only part of the problem.

Management also is asking: "Do our prices cover costs and a profit margin?" Again, the answer hinges on the question: "Do you know your costs?" Some companies are having trouble because they do not include all elements of cost in their prices. Others have an equally basic problem: Their records are not adequate. Both conditions are particularly prevalent in industries plagued by price fighting.

Because the profit squeeze is on, most companies are taking a closer look at their costs. Like Emerson, many have teams to detect and control them. Some are installing or improving their cost accounting systems. Others are using techniques like functional costing to develop their information a different way.

The Rub—Even if you think your records are satisfactory, you do not have just cause for complacency. Cost accountants will tell you that, academically, there is no such thing as a 100-per-cent "true cost." Direct labor, for example, may be billed at $1.80 an hour. If the man is idle 5 minutes out of each 60, the rate is really $1.95.

The question of "true" costs boils down to this: How "true" can you afford to make them? It may cost you more than it is worth to track down your "true " direct labor cost. A big judgment factor also is involved. What base, or bases, will you use to determine your "true" direct labor cost?

Companies refining their costs are going after the big ones like distribution and selling. They have a pretty good idea of what they are, but they are seeking to improve their tolerances.

No doubt about it, you can improve your profits if you know your costs, but some companies still prefer to fly by the seat of their plants.

Get Your Money's Worth

"Some of our members are losing money or barely breaking even because they do not put all items of cost in their bids," says one trade association executive. "It's generally a case of not knowing what to include or not understanding the importance of making a profit. Many of our people came up through the shop. They are used to working for so much an hour, and it's a battle to change their way of thinking.

"I have a tough time getting them to include overhead in bids, let alone a profit margin. That explains why bids on a job vary all over the lot. It also explains why the mortality rate is so high in our industry. You may be able to get along for a while on loss business, but you're in a jam when tax paying time comes around or an emergency arises."

Definition—The price you put on your product should cover materials, labor, overhead, selling and administrative expenses, income taxes and a margin of profit that will provide funds to operate and grow on.

Overhead includes a great number of items, such as heat, light and power, depreciation on equipment and buildings, rent, real estate and personal property taxes, fire insurance, maintenance, Workmen's Compensation Insurance, vacations and paid holidays.

allocated to each unit sold to recover the total of all such costs.

"At this point there is a large unknown. What is the future volume of sales over which these costs must be distributed to assure their full recovery provided competitive conditions permit? In a period of low volume, a manufacturer who attempts to recover his entire overhead costs out of the unit selling price will price himself out of his market. On the other hand, if he distributes his overhead costs on the basis of a temporarily high level of demand, he will mislead himself as to his real average unit cost and thus fail to recover them. This is to say that indirect costs or overhead must be prorated on the basis of an average volume in relation to capacity and the anticipated market.

"A manufacturer will soon be in a precarious position if all he does is recover total costs without making a profit on his operations. His position is further aggravated when the cost of replacing his capital equipment and tools is greatly increased by inflation. He will be unable to finance the continuous development of his product so necessary in today's markets. So it becomes essential for him to run his business efficiently not only in order to recover his costs but also to make a profit so that the business may grow and prosper.

"But no manufacturer can make the decision as to price without regard to competitive prices and the wishes of his customers. If his price is too high relative to the prices charged by his competitors, he will lose volume and slip behind in the competitive struggle. Our practice has been to set prices that are fully competitive and which we hope will be attractive to our customers. Then we try to increase our profit by reducing our costs below what we had calculated they might be, with no certain knowledge as to what the volume would be on each line."

And—Whether you mass produce left-handed monkey wrenches or run a contract job shop, knowing what your costs are today isn't enough. Says H. T. McAnly, partner in Ernst & Ernst, the Cleveland accounting firm:

"In planning a pricing structure, we are dealing with the future. Cost information relating to current or past operations cannot be used in planning without adjustment unless future operating conditions and price levels are expected to coincide with the present or the past."

He points out that prices should include anticipated changes in material prices and wage scales. Overhead rates should be adjusted accordingly. Mr. McAnly also advises the depreciation of all physical properties in use on a current replacement cost basis. (Stipulated procedures still must be followed in figuring depreciation for tax purposes.)

Of course, knowing what elements of cost should go into your prices won't be of much help if your records aren't adequate.

Whistling in the Dark

Robert B. Hill, industrial engineer, Canada Iron Foundries Ltd., stated before the annual meeting

The Kind of Information You Need

To keep your company competitive these days, you need answers to questions like these . . .

1. What is the unit cost of each product you make?
2. What are your costs resulting from the sale of particular products or product lines?
3. What are your costs resulting from sales to particular customers or classes of customers?
4. What are your costs resulting from sales in particular territories?
5. What are your costs resulting from various units of sale?
6. How much expense is incurred by each activity in your business?
7. Which costs need to be reduced?
8. What are your costs at different volume levels?
9. What are your break-even points at different cost levels?
10. What is your normal operating capacity?
11. What is your normal overhead rate?
12. What are rising material and labor costs doing to your profit picture?

of the Gray Iron Founders' Society last year: "After the end of the war in 1945, the Canadian gray iron foundry industry was left with a large amount of excess capacity . . . the vast majority of foundries, small and large, had no cost systems which would tell the cost of an individual casting. Indeed, many of them had no cost system at all. Flat prices per pound were the rule . . . this type price had not caused too much trouble when general price levels on castings were high.

"When times became competitive, customers began to shop around. The Canadian foundries were ill prepared for this. Most foundrymen realized that there was some difference in cost per pound between the simple and complex work, but few realized the difference. They did not, and many still do not, recognize that there can be a spread of around 25 cents a pound between simple municipal castings and complex pump or compressor castings.

"As a result of this lack of cost knowledge, combined with excess capacity, casting price levels decreased to the point where profits were nonexistent and many foundries were forced to go out of business."

Here, Too — The situation Mr. Hill describes also applies to some of his country's good industrial neighbors to the south. The Small Business Administration explains what has happened this way:

"Only a few years ago a manager could concern himself almost exclusively with problems of production and sales. In recent years his problems have been increased many-fold by such matters as governmental regulations and controls, federal and state taxes, ever-narrowing margins between costs and

How Do Your Records Rate?

	PROGRESSIVE	AVERAGE	WEAK
ACCOUNTING			
1.	Procedures, records, forms, reports designed with a view to producing required information at lowest cost	Accounting fairly comprehensive, accurate, prompt and well managed—some written procedures	Accounting accurate from bookkeeping standpoint, but generally "old-fashioned" and incomplete
2.	Accounting data supplied promptly, in a form best adapted to its use by management	Accounting data not adequate in comparison with most modern conceptions of control by standards	Accounting not highly regarded as a tool of management
3.	Modern accounting equipment used effectively in preparation of necessary information and reports	Accounting machines used but not adaptable to modern methods	Accounting equipment antiquated, cumbersome and wasteful
STANDARD COSTS			
1.	Cost system designed to reflect all variances between standard and actual costs	Cost accounting fairly accurate but not organized to provide standard cost information promptly	No standard costs. Job costs inaccurate and uncontrolled
2.	Variances from standard performances supplied currently to management for corrective action (daily or weekly as needed)	Records and reports not best suited to control costs and expenses	Cost information mostly estimated. Monthly profit-and-loss statements inaccurate
3.	Unnecessary accounting records eliminated—management control reports furnished as needed	Many records, reports and statistics maintained that are not useful as a tool of management	Some records and reports prepared; have no practical advantage
4.	All control records and costs integrated with standard costs	Records unrelated to control and of little assistance	Production records required for suitable cost control not maintained
5.	All estimates for product pricing based on standard costs; guesswork is eliminated; loss of volume or profit is indicated	Estimates not checked against actual cost	Estimates determined by past performance and competition
6.	The effect that sales mixture and product selling prices have on the total company profits picture at varying operating levels is known at all times	No knowledge of the effect on total business profits of individual product or order pricing	Profit or loss estimated monthly; verified and adjusted annually to inventory; no profit or loss known by product breakdown
7.	Effect of additional volume on cost and profit is easily determined. Break-even points determined	Effect of additional volume on cost and profit not easily determined. Break-even points not determined and their value underestimated	Additional volume usually authorized to keep plant busy without knowledge of effect on cost and profit. No knowledge of sales mixtures or break-even point

Source: Small Business Administration

income, changes in supply and demand and an ever-increasing amount of paper work . . . you must have accurate and current information concerning all phases of your business operation. And you must make use of it in a program of action."

A recent Dun & Bradstreet analysis of business failures states that 55.5 per cent of them were due to incompetence of management and 14.7 per cent were due to unbalanced experience (limited to sales, production or only one management function). "Managerial incompetence or inexperience," comments the SBA, "shows up in the lack, or inadequate development, of sound policies and procedures." A dozen common pitfalls are listed. The first two: 1. Inadequate records. 2. Inadequate cost information.

Definition — To compete today, you must know the cost of operations, processes and products. Cost accounting is a method of recording, analyzing and interpreting such information. Old-style bookkeeping will not give you the answers you need.

Many trade associations are urging members to set up cost accounting systems. The Gray Iron Founders' Society Inc., Cleveland, has been at it since 1930. It has published two cost manuals, and the services of three cost consultants are made available to those who want help in putting in a cost accounting system. The program doesn't stop there. To get an idea of whether their costs are out of line, members may join cost groups in their market area. (Canadian members recently started one.) Coded information on costs (which hides the identity of the company) is sent to the consultant who compiles the information. Each

PROGRESSIVE	AVERAGE	WEAK
BUDGETARY CONTROL		
1. Budgetary control of all expenditures based on flexible performance standards equitably established by operating levels	1. Budget structure rigid; ratios of expense to sales based on past performance, not on predetermined, flexible performance standards	1. No attempt made to budget or forecast performance
2. Sales budget by products, salesmen, customers, territories, based on market analyses	2. Sales budget by products, salesmen, customers and territories—based on past sales performance only	2. No sales budget. No "quotas" for salesmen. No program
3. Knowledge and control of the effect of all selling price changes on budgeted amount of total net profits	3. No centralized control of selling prices within limits of predetermined profit requirements	3. No established pricing policy. Cost estimates ignored where considerable volume is involved. Effect of cutting prices to meet competition not projected in terms of lost profits
4. Daily, weekly or monthly reports on the performance of all departments controlled through: 1. Standard or budgeted performance. 2. Variance from standard performance.	4. Divisional accounting reports periodically exhibited: 1. Comparison of current with past periods. 2. No standards, therefore, no comparison of actual results with what should have been accomplished, and no analysis of the causes of variations	4. No budgets; no broad long-term planning. Policies vacillating because not founded on complete comparative information and thorough analysis
FINANCE		
1. Forecast of working capital and cash requirements for planned business volume and profits level	1. No forecast of working capital or cash requirements. Funds not always obtained or employed	1. Working capital and cash inadequate; credit policy lax. No forward planning
2. Adequate reserves for replacement of obsolescent and depreciating assets—represented by earmarked liquid funds to the extent required	2. Depreciation reserves conditioned on allowable deductions for tax purposes only; not properly planned from a capital asset replacement point of view	2. Nominal reserves without due regard to actual value of assets; frequently used for purposes other than originally intended
3. Dividend policy consistent with sound, long-term financial program	3. No definite financial or dividend policy	3. Financing dictated by immediate need for cash to meet pressing obligations

quarter cost consultants get together with members of local cost groups and costs are compared.

"It's perfectly lawful," says Donald H. Workman, executive vice president of the society, "as long as the discussion is limited to costs."

Trade associations are particulary keen on know-your-cost programs because they recognize that inadequate knowledge is a prime cause of what can be an industry-wide problem: Price fighting.

Knock Down, Drag Out

Says the president of a successful, medium-sized company; "We're working at near capacity, a situation where I could take in a little low-margin business to help pay off some of our fixed expenses. So I submitted two bids on small jobs recently, cutting my profit to the bone. I was underbid by 10 per cent, and I know the successful bidders can't afford the business. We've compared costs on jobs we've had jointly. They just don't know their costs. This leads to price fighting."

A trade association official observes: "The trouble with price fighting is that it focuses attention on the wrong side of the problem. Cutthroat competition, salesmen and purchasing agents are often blamed. We tell our people not to panic, not to believe the stories they hear about lower bids. The place to lick the problem, we point out, is in your plant. First, know your costs. Second, accept only that business on which you can recover your costs, plus a profit."

A purchasing agent in the machine tool industry puts it this way: "In a purchasing position it is my responsibility to my company to buy everything as economically as possible. However, it is my conviction that I do my own company as well as my supplier an injustice if I force him or even permit him to supply on an unprofitable basis. Unless the supplier is a large company, there is always the possibility that selling at break-even or at a loss will force him out of business, and that doesn't help us at all. Even the large company cannot stand this indefinitely."

Some Hidden Costs

"Keep an eye on labor costs. They may be deceivingly low if fringe benefits are not properly accounted for."
—President

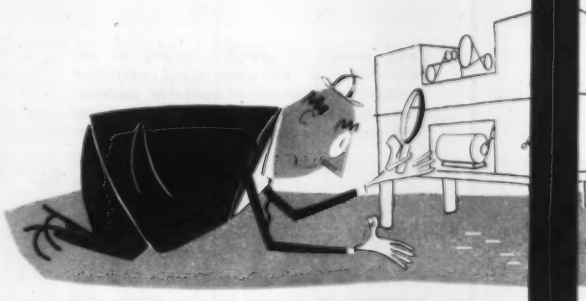
"I'm working my men 58 hours a week. We could operate on Sundays, but don't. The men are tired and would be inefficient. Costs would shoot up."
—Manager

"We analyze each job after it is completed. If material costs are out of line, it may mean we have omitted extras for such things as width, length, quantity and finish in our original estimate."
—President

"If your profits are slipping, take a look at the kinds of work you are doing. Your equipment may be ideal for one job, while it is not so efficient on another. We have our equipment graded for the different work we do. Salesmen are urged to push the most profitable items."
—Sales Manager

"When orders are cut back, you are running lower quantities at a more or less fixed price. This will bring up the costs on the job."
—President

"Some people don't wind up where they think they should at the end of the year because they do not fully recover administrative and selling expenses in their prices . . . such as salaries and travel expenses of executives and salesmen. You can get a lot of argument on how to allocate these expenses, but time seems to be the most reasonable basis: The estimated time the executive or salesmen spends on each job or product."
—Controller

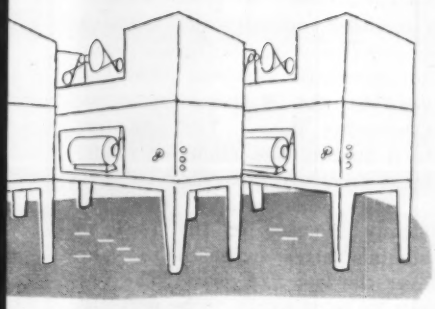


Related—Another industry-wide pricing problem stems from an inadequate knowledge of costs. Mr. McAnly warns: "It must be recognized that uniformity in cost application within an industry is extremely important. Otherwise, if prices are planned using widely varying methods of expense applications, the resultant target prices will not be comparable and could produce a general lowering of a competitive price structure."

He gives this example: "Say you have a foundry and sell by the pound. Some of your competitors

You May Overlook

1. Additional labor costs caused by:
   A. Defective materials
   B. Defective equipment
   C. Use of equipment not suited for job
   D. Tool trouble
   E. Excessive setup time
   F. Idle time paid for
   G. Overtime premiums
   H. Excessive time taken by untrained employees
   I. Failure of individuals on piecework or standard time incentive to make guaranteed earnings
2. Waste and spoilage of materials
3. Changes in quantities of material, in processing or fabricating time because of:
   A. Changes in specifications
   B. Changes in product design
   C. Changes in method of manufacture
   D. Changes in material prices
4. Expenses incident to the planning, receipt, storage and handling of materials, semifinished products and finished products
5. Cost of taking inventory
6. Development cost of the product or general development costs
7. Direct advertising, servicing and guarantee costs
8. Overhead items like insurance, property taxes, depreciation of plant and equipment
9. Income taxes



are determining their prices by the amount of labor and overhead involved in making a product. Your prices and profit margin will be low on light, complex castings. You're not using much material, but your conversion cost is high. Your competitor's prices (and profit margin) will be low on simple heavy castings. Not too much labor, with its attendant overhead, goes into their making, but the investment in material may be substantial. Customers will shop around. They will buy the light, complex castings from you; the simple, heavy ones from your competitors. The result is that you spoil each other's prices."

Some industries are correcting such a situation. The trend in the gray iron foundry industry, for example, is a "per piece" price.

Ask Yourself—Many companies have reached this plateau: Their prices are realistic, and they have adequate cost records. But they still aren't satisfied. They want more information.

Cost Fighters

Probably the biggest cost hunt on record was staged recently in Cleveland. More than 100 members of the American Steel Warehouse Association and the National Association of Aluminum Distributors were in session for three days. Their object: To find a new way to determine distribution costs. Prof. Thomas J. McGann of Marquette University was called in to discuss functional costing.

Since the Cleveland meeting, the project has taken on nationwide scope. "Before the year is out, I believe more than 100 companies in the industry will switch to functional costing," says Robert G. Welch, executive secretary of the steel group.

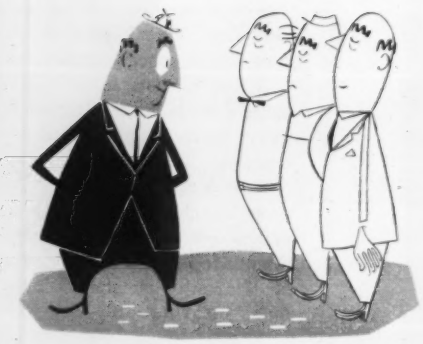
Like conventional cost accounting, the system arrives at product costs, but the information is developed in a different way. Costs are charged to functions instead of being lumped into conventional classifications. For example, in the warehouse supplies account, appropriate costs are posted to the function: Slitting, shearing, delivery, order filling and supervision.

Professor McGann recommends the system for distribution cost analysis. "It will show how much expense is incurred for each activity of the business," he says. "This will quickly spotlight costs and will highlight areas of possible inefficiencies . . . when functional costs are determined, some appropriate yardstick can be used to measure reasonableness."

How close is this to "true" costs?

The Yardstick

Many companies maintain that "actual" costs aren't enough. They



Your Cost Detection Team

Whether you are just getting around to installing a cost accounting system or embarking on a standard cost project, its success hinges on company-wide co-operation.

It is top management's job to sell the program and keep it sold. It also must be made known that top management is behind the program 100 per cent. Otherwise, it will probably fizzle out because of general apathy toward costs.

The treasurer or controller, working closely with department heads, has the primary responsibility for cost detection in many companies. Department heads, in turn, delegate responsibility to section heads and special assistants. In one company, the manager of production has an industrial engineer on the prowl for costs. But the job doesn't stop here.

You must have the understanding of the man in the shop, particularly the foreman. Your costs reports will be only as accurate as the basic records prepared by these people.

Cost detection is a continuing effort. Most of the people on your team will be concerned with keeping a finger on those costs that vary from day to day. Committees are often set up to explore such questions as: "Do we know all we should about this cost?" They usually include an accounting official and key people directly concerned with the problem.

use "standard" costs for such things as direct materials, direct labor and overhead. Generally set up by the company's industrial engineering department, "standards" represent what the costs should be.

"Profit Planning," a booklet put out by Continental Can Co. Inc., states: "Standard costs are the true costs. Expenditures above standard are caused by: 1. Errors in judgment. 2. Inefficiencies. 3. Waste. 4. Spoilage. 5. Delays.

"Such expenditures have no place in sound, legitimate costs. They are excesses above the standard cost and devour profits . . . Actual costs, so-called, collect and charge into product cost not only the legitimate material, labor and expense, but also all the inefficient and wasteful expenditures. How, then, can one call the over-all results true and reliable costs?

"Standard costs exclude all excesses. Excesses are treated as added expenses beyond the controls—controls that have not yet achieved their full benefits. Such excesses are considered as direct charges against income.

"Under so-called 'actual costs,' management cannot measure the nature or extent of excess costs. No yardsticks exist . . . good and bad performances are bagged together, with no way of separating the wheat from the chaff."

Is this the ultimate?

A Hunting We Will Go

Many companies, even entire industries, still ask: "Do we really know our costs?" Like shrewd horse traders, they're giving all parts of the business animal a thorough going over.

A small electronics firm stopped the practice of ordering $5 worth of memo pads or $3 worth of staples when it found that it cost $9 to handle a purchase order.

A steel warehouseman was surprised to learn it cost him a minimum of $26 to $28 to process small orders.

A wholesaler found that 50 per cent of its customers accounted for less than 2 per cent of its business. Forty per cent of the items in stock represented less than 2 per cent of its sales.

Why?

Of course, this relentless drive on costs is inspired in large measure by the profit squeeze in metalworking. It stands to reason that you must know your costs before you can recover your costs and a profit in your prices, or reduce your costs when competition won't let you adjust your prices upward.

Another reason for cost fighting is given in a study of general and administrative expenses made last year by the National Industrial Conference Board. The president of a heating and plumbing equipment company observes:

"There has been a slight but steady increase in the ratio of administrative expenses to sales over the last five years. The reason we must apply, to be perfectly candid with ourselves, is that we are more efficient and progressive as manufacturers than we are as administrators . . ."

Such self-criticism is common today. And it's paying off for many companies.

Remember what Emerson Electric did?

Not Just "*On Order*"...

UNIVAC Savings Are Being Delivered!

The Remington Rand Univac*—first "giant brain" on the market—has been delivering unprecedented electronic savings to its users for the past five years. The economies of Univac data-processing and the accuracy of its *exclusive* self-checking features have been proven at installation after installation.

There are more Univac Systems in actual customer use than the *total of all other large-scale electronic computers combined*. And, production has been geared to meet this ever-increasing demand, so that today we can deliver the Univac System whenever the customer is ready for it.

With every Univac delivered goes 10 years' experience in electronic computing... 5 years' experience in the commercial type of data-processing. This wealth of background in programming and operation is unobtainable elsewhere. It has been gathered through solving actual customer problems—on Univac—not theoretical solutions with non-existent computers. It is your assurance that, when you install the Univac, you'll get under way faster, surer, and more economically because the System has already handled similar work.

In today's competitive market, the company which cuts its overhead first comes out on top. So don't wait until 1957... 1958... or 1959 to cash in on the tremendous savings available to you now with the Univac System.

Remington Rand Univac

DIVISION OF SPERRY RAND CORPORATION

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Makers of: Univac I • Univac II • Univac Scientific • Univac File-Computer • Univac 120 • Univac 60 • Univac High-Speed Printer

Use WELDED STEEL for Greater Strength with Less Weight!

Above you see one of four identical pieces recently produced and machined by Mahon. It is part of a machine designed for use in the manufacture of paper plates. This piece, and the parts and assemblies illustrated at the left, are typical of thousands of Steel-Weld Fabricated units produced and machined by Mahon for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. Are YOU making full use of welded steel components in your products? In some instances pattern cost and time are an important factor . . . in others the strength-weight ratio is important. In the design of almost any type of heavy machinery, there are pieces and sub-assemblies that lend themselves to more economical production in welded steel. If you build such machinery or equipment, you will be interested in Mahon's facilities to serve you . . . because, the Mahon organization is a unique source for welded steel in any form . . . a source with complete facilities for design engineering, fabricating, machining and assembling. See Sweet's Product Design File for information, or have a Mahon engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

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Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

STEEL
March 19, 1956

Technical Outlook

UTILITIES HANDY— At the Sandusky, O., plant of New Departure Division, GM, air, oil and steam lines are run along catwalks, about 9 ft above the floor. It puts them close to the machines and makes servicing easy. Ladders do not clutter the aisles.

STUB SAVINGS— Another hint from New Departure: Weld scrap metal studs to one end of bar forging stock. The upsetter operator grabs the stud with his tongs and can forge parts from the bar right down to the last nubbin.

MAGNETIC PERSONALITY—Some of the qualities you can expect from new ceramic magnets: High electrical resistivity, great resistance to demagnetization, noncritical constituents (barium and iron oxides), low cost, wide variety possible in size and shape, somewhat lower energy product than conventional metallic permanent magnets but production of maximum energy under most conditions. One type, called Ceramagnets, is made by the Stackpole Carbon Co.

TOPPED—The newest can closing machines made by American Can Co. can seal the tops on cans at the rate of 1000 a minute. They can be adapted to several sizes and gas or steam closing procedures.

FLEXIBLE GLEAM— "Almost all flexible films can be given a bright metallic finish . . . our research has shown that many materials previously thought unsuitable for metallizing can now be coated," says Richard B. Morse, president, National Research Corp., Cambridge, Mass. Foiltone Products Inc., subsidiary of NRC, is turning out metallized plastics, including Mylar and cellulose acetate. Metallized polyethylene and vinyl films will be offered soon. Uses are in metallic yarn and interior auto trim. Also being developed is bright aluminized paper.

HOT STRENGTH— Udimet 500, a new superalloy made by Utica Drop Forge & Tool Corp. in its vacuum furnaces, is reported to have an ultimate tensile strength of 100,000 psi at 1600°F and will withstand 28,000 psi for over 100 hours at that temperature. It is being used for jet engine turbine bucket forgings. It's a nickel-chromium-cobalt alloy with 3 per cent each of titanium and aluminum.

OPEN-HEARTH HOSE— Goodyear reports it has developed a better hose for open-hearth furnace doors. Made with a special rubber compound to handle hot water and steam, it is reinforced with braided steel wire and insulated with asbestos. The outside surface is protected with an open braid of stainless steel wire.

LOOK TO RHENIUM—This $1000-a-pound metal may hold the answers to a lot of questions on high temperature strength. It stays strong to 75 per cent of its melting point when other metals begin to fail at 50 per cent. A guess by Dr. Walter R. Hibbard Jr. of GE Research Laboratories: Rhenium's normal structure may be analogous to the submicroscopic particle makeup of sintered aluminum powder (SAP) which also stays strong to 75 per cent of its melting point.

HARD PAPER— Soft acoustical tile is hard on the drills that make all those little holes in it. Average life was 4000 holes until the tubular drills were flame plated with 0.002-in. of tungsten carbide. Now they drill 200,000 holes.

Metalworking Outlook—p. 37 Market Outlook—p. 141

Six Steps to Efficient Lubrication . . .

Know what you require by checking your production equipment with operating manuals. List all the recommended lubricants

Simplify the list by checking closely for duplication of lubricant types

Schedule the lubrication program on paper and give each oiler specific instructions. Eliminate the hit-or-miss attack

Standardize on application methods and fittings. Mark containers, so there's no mistake as to what they hold

Establish a maintenance schedule that keeps machinery in repair. Check circulating and hydraulic oil for contamination

Update handling and storage. Buy in the largest practical quantities. Use racks to aid storage and dispensing

Simplify Your Lubricant Needs

By BRUCE M. DUNHAM
Technical Consultant
Industrial Products Department
Sun Oil Co.
Philadelphia

EVER WONDER why it takes so many oils and greases to lubricate plant equipment? It's a universal problem, and plant personnel associated with purchasing and maintenance are always looking for ways to reduce the number of lubricants and be guaranteed satisfactory operation.

The solution to the problem gets complicated when plant men add up the many lubricants recommended by machine manufacturers. Consider the requirements specified by the manufacturers of these machines:

1. **SURFACE GRINDER**
   General lubrication — (oil), 500 @ 100°F oil; General lubrication — (grease), Lime-base grease; Tableways, Special way lubricant; Gear housing of table traverse, 750 @ 100°F oil; Spindle lubrication, 150 @ 100°F oil.
2. **MILLING MACHINE**
   General lubrication—(oil), 300 @ 100°F oil; Grease lubrication, Soda-base grease; Ram, 750 @ 100°F oil; Feed drive, 950 @ 100°F oil; Cutterhead, 150 @ 210°F oil; Knee, saddle and arbor, 300 @ 100°F oil; worm gearbox, Compounded cylinder oil.
3. **10-IN. PLAIN HYDRAULIC GRINDER**
   General lubrication, 200 @ 100°F oil; Grease lubrication, Lime-base grease; Tableways, Special way lubricant; Hydraulics, 150 @ 100°F oil; Spindles, 100 @ 100°F oil.

If these machine tools are in one shop, manufacturers say they'll require *ten* different oils and *two* greases, *exclusive of the cutting fluids*. The problem can become a nightmare in a shop that has hundreds of varieties of machine tools and supplementary equipment.

Complexity — Machine manufacturers design equipment for specific operations. These machines vary in speeds, loads, operation temperatures and pressures. They vary in tolerances, sizes and shapes, and they vary in methods of lubricant application.

Manufacturers specify lubricants which accommodate the specific operating conditions and which, under test, have proved their ability to function satisfactorily. As a result, it does require many types of lubricants to assure proper and lasting service.

The equipment manufacturer doesn't try to complicate lubricant requirements in his design. In fact, he takes great pains to simplify it. The problem of utilizing a wide variety of lubricants arises only when an equally wide variety of equipment is in one plant.

Example—Here's what a modern manufacturing plant faces (see Table I). We'll try to solve its problems (too many lubricants) by surveying its requirements.

Table I lists lubricants which accommodate typical applications. It shows the types of lubricants used, the approximate viscosity of the oils and the applications for which they are intended. The company is purchasing, storing and dispensing 42 separate lubricants.

An analysis shows this plant is using five general-purpose oils, three machine tool spindle oils, seven gear oils, three hydraulic oils, two way lubricants, four greases, three soluble cutting oils, five nonsoluble cutting oils, three quenching oils, one die compound, three circulating system cleaners and three motor oils.

Simplification—Here's what can be done in combining, replacing and eliminating some of these products. Oil No. 17 will replace Nos. 1, 3 and 9 for general, once-

through oiling and gearboxes. No. 16 can do the jobs of Nos. 2 and 8 for air compressors, electric motors and spindles. Quenching oil No. 33 can replace No. 34 and as a spindle oil to replace oil No. 7.

Hydraulic oil No. 18 may be used for general oiling to replace No. 5. No. 12, and SAE-90, extreme-pressure oil, may be used for industrial gearbox applications replacing No. 10. No. 13, and SAE 140 extreme-pressure oil, could replace Nos. 11 and 14 for lubrications of industrial worm and hypoid gears. If it is necessary to lubricate automotive-type hypoid transmission gears, then two oils (Nos. 10 and 11) must be retained and may be used in place of Nos. 12, 13 and 14.

Solubles—An SAE 80 grade of way lubricant will suffice for 99 per cent of all way lubrication. Generally, oil No. 19 is used, and No. 20 rarely is necessary. Grease No. 23 may also be used for the lubrication of open gears unless they are operating above 160° F. Oil No. 15 could be eliminated. If the gears are operating above 160° F, it may be possible to use No. 13 and No. 35 oils.

It usually is not necessary to use three soluble cutting oils in one plant. Oil No. 25 may be used for No. 26 as both a general machining oil and a grinding oil in water-oil ratios to accommodate these operations. A heavy-duty emulsifiable oil like No. 27 may be necessary in some shops for difficult machining operations on alloy steels. However, an oil like No. 25 generally may be used for over 95 per cent of operations requiring a soluble oil.

The five nonsoluble cutting oils may be reduced to three: No. 28, for machining nonferrous metals (high speed, screw machine operation); No. 29, heavy-duty oil compounded for such operations as tapping and broaching on high alloy steels; and No. 30, general-purpose cutting oil.

The last is for a large range of machining operations on automatic screw machines, turret lathes, chucking machines, gear cutters, drill presses, milling machines, light stamping presses, pipe nipple and other thread-cutting machines. The trend is to employ a light-

Table I—A Manufacturing Company's List of Plant Lubricants

This list of 42 lubricants was trimmed to just 21 by combining applications. Retained lubricants are indicated with a black line. One grade replaces Nos. 40, 41 and 42

Lubricant Number	Viscosity (Ssu @ 100° F. Approx.)	Application
1.—Replaced by 17	300	General once-through oiling
2.—Replaced by 16	150	Air compressors, electric motors and spindles (below 5000 rpm)
3.—Replaced by 17	300	Gearboxes
4.	500	Circulating and hydraulic systems with excessive leakage
5.—Replaced by 18	1200	General oiling
6.	50	Spindle speeds above 8000 rpm
7.—Replaced by 33	100	Spindle speeds 5000 to 8000 rpm
8.—Replaced by 16	150	Spindle speeds below 5000 rpm
9.—Replaced by 17	300	Straight mineral oil for normally loaded gears
10.—Replaced by 12	SAE 90 (MIL-0-2105 Type)	Hypoid and other gears except worm-winter
11.—Replaced by 13	SAE 140 (MIL-0-2105 Type)	Hypoid and other gears except worm-summer
12.	SAE 90 (lead naphthenate type)	Heavily loaded gears except hypoid-winter
13.	SAE 140 (lead naphthenate type)	Heavily loaded gears except hypoid-summer
14.—Replaced by 13	2500—Compounded gear oil	For worm gears
15.—Replaced by grease	500 (@ 210°F) Open gear oil	Open gears
16.	150 (R & O type)	Systems using vane pumps
17.	300 (R & O type)	Systems using variable displacement piston pumps or gear pumps
18.	750-1000 (R & O type)	Systems using variable displacement pumps or gear pumps
19.	300-350	Normal use
20. Replaced by 19	900-1000	High pressure use
21.	——	Sodium, lime or lithium-general purpose
22.	——	Sodium, lime or lithium, oxidation inhibited for antifriction bearings
23.	——	Sodium, lime or lithium, E.P. type—for heavily loaded bearings
24.	——	Synthetic—for high temperature applications
25.	300-600	General machining
26.—Replaced by 25	300-600	Grinding
27.	200-500	Heavy duty operations
28.	——	Various cutting operations
29.	——	Various cutting operations
30.	——	Various cutting operations
31.—Replaced by 28	——	Various cutting operations
32.—Replaced by 29	——	Various cutting operations
33.	100-120	General-purpose quenching
34.—Replaced by 33	100-120 (Compounded)	General-purpose quenching
35.	1100-2500	Martempering
36.	——	Graphite type—for hot forging
37.—Specialty product	150-200	For cleaning contaminated hydraulic systems
38.—Specialty product	300	For cleaning contaminated hydraulic systems
39.—Specialty product	750-1000	For cleaning contaminated hydraulic systems
40.—Replaced by SAE 10W-30	SAE 10	Shop trucks
41.—Replaced by SAE 10W-30	SAE 20	Shop trucks
42.—Replaced by SAE 10W-30	SAE 30	Shop trucks

General Recommendations for Machine Tools

Parts to be Lubricated	Grade (Approx. Visc.SSU @100° F)
Machine, general hand, mechanical, splash or circulating systems:	
Low viscosity	150
Medium viscosity	300
High viscosity	500
Gears (Enclosed)	
Light duty	500 to 900 (SAE 90)
Heavy duty (including worm gears)	2500 (SAE 140) E.P.
Hydraulic systems	
Low viscosity	150
Medium viscosity	300
Spindles	
High speed (oil)	50—150
Low speed (oil)	100—300
Grease lubricated	N. L. G. I. No. 1
Ways	
Average loading	300 to 400 (Special oiliness and E. P. qualities)
Abnormal loading	1000 (Special oiliness and E.P. qualities)
Grease lubrication	
Normal temperatures	Lime-base grease N.L.G.I. No. 1
High temperatures	Soda-base grease N.L.G.I. No. 2

Applications for Lubricating Oils of Various Viscosities

Lubricating Oil Viscosity (SSU @ 100° F)	Application
100	High speed bearings, high speed gears, machine tool spindles (5000 to 8000 rpm), quenching oil, hydraulics
150	General purpose, gearboxes, hydraulics, spindles, electric motors, generators and fans (under 1800 rpm), turbines (direct connected), machine tool circulating systems, airline lubricators, quenching oil, air filters
300	General purpose, hydraulics, electric motors, generators and fans (over 1800 rpm) machine tool automatic systems, turbines (geared), air compressors, vacuum pumps, gearboxes
500	General purpose, gearboxes, turbines (ring oiled bearings), geared motor-generator sets, hydraulics, slow speed diesels, compressors
750 to 1000	Gearboxes, high temperature bearings, hydraulics, general-purpose oil, slow-speed diesels, gearmotors and reducers, calender and mill bearings, steam-turbine bearings, pump bearings, gas compressors

colored oil which does a job equally as well as black oils but allows better visibility of work.

Plant Jobs—An SAE 10W-30 motor oil will replace Nos. 40, 41, and 42. Circulating system cleaner oils (Nos. 37, 38 and 39) are specialty products only purchased and used when necessary to clean contaminated hydraulic systems.

Result—Combining requirements this way reduces the list from 42 to 21 lubricants. They will do an adequate job for this plant.

Other considerations may further reduce the number of lubricants in a large plant of this type. It may be possible, for example, to replace three greases (Nos. 21, 22 and 23) with a lithium grease containing both an extreme-pressure additive and an oxidation stabilizer. Although a grease of this type has a higher initial cost, it may result in the best over-all economy.

Survey—The first step in a simplification program is to conduct a plant survey. Lubricant supplier can help by loaning trained engineers to aid plant personnel.

Inspect each machine with the aid of manufacturers' operating manuals. When conducting the survey, the lubricant required should be specified for each lubrication point. After data have been accumulated for all machines, study them with the intention of reducing the number of lubricants to a minimum consistent with good operating practices.

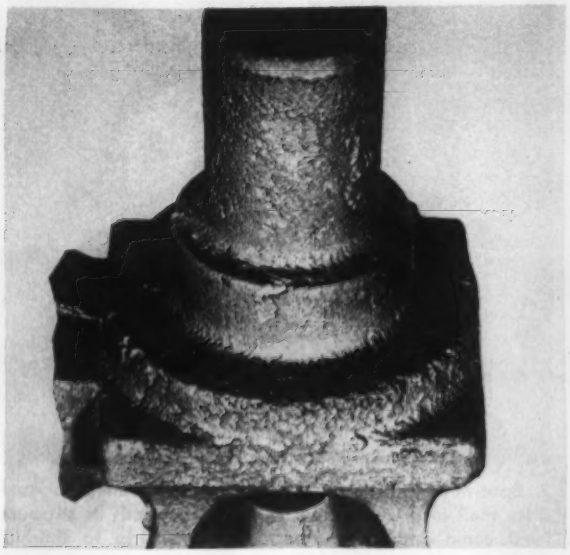
Charts — Following standardization, the survey should be typed and distributed to all personnel directly concerned with lubrication responsibilities.

Next, a lubrication schedule should be set up, so each piece of equipment receives the lubrication it requires.

It's also a good idea to standardize on items like grease fittings. It will preclude the oiler having to use a variety of fittings.

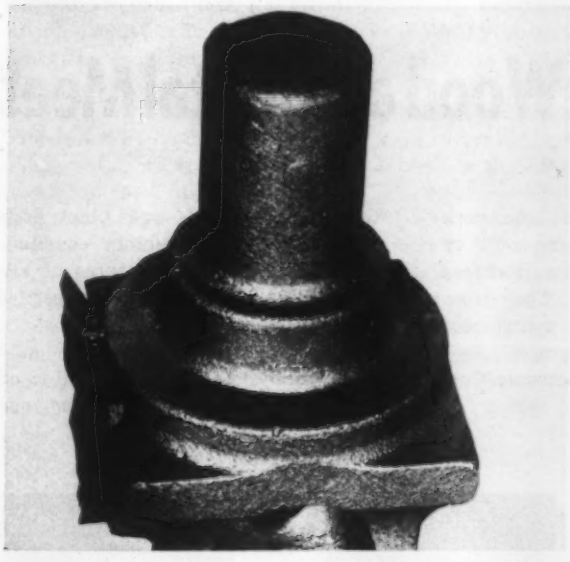
Meet the Author

Bruce M. Dunham has ten years of experience as a technical consultant on industrial products to the Sun Oil Co., Philadelphia. A graduate of the University of Cincinnati, he also worked as a research and development chemist with Kendall Refining Co., Bradford, Pa.



This hub, a 31-lb, low carbon steel casting, made in the usual shell mold mixture, shows the problem attacked by the Steel Founders' research project

Big improvements in the surface finish of the test casting were made by additions to the original shell molding sand mixture



Smooth surface finish was achieved by substituting other materials for silica sand and making additions to the resin bond

You Can Shell Mold Low Carbon Steel

Research has solved gas generation and mold reaction problems that plagued early shell molding

LOW-CARBON, low-alloy steel castings now can be made in shell molds. The process is being developed by the Steel Founders' Society of America, Cleveland.

Member foundries and researchers at Massachusetts Institute of Technology worked on the project.

Previous attempts to cast low carbon steels in shell molds failed because the standard silica sand and resin mixtures generated a great deal of gas, and there was a chemical reaction between the mold surface and the metal poured against it.

Research—Investigations showed that variations in the standard shell mixtures were necessary.

Design of gates and risers was found to be similar to that needed in sand molding.

The best sand for shells was found to have an AFS grain fineness number between 80 and 100.

Dimensions—On simple jobs, tolerances can be held to 0.004-in. for each inch of length. On jobs with complicated contours, tolerances are 0.007-in. for each inch of length. Biggest use of the process is seen in the 1-to-50-lb range. The society predicts it will be used to make parts formerly machined out of solid stock or forged. It also will be used to reduce machining on steel castings.

Discoveries which came out of the research resulted in chemical additions to the sand and the use of compounds other than silica sand.

1. Hydraulic folder forms 20-gage steel sheets into the top-and-side shells for TV cabinets. Basic shell structure can be used for either the wood-metal or the all-metal cabinet

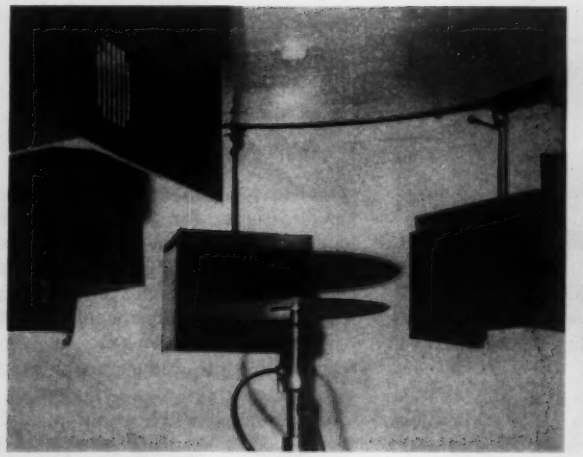
2. Spot welding brackets and supports in the metal top-and-sides shell of a wood-metal TV cabinet stiffens its structure. Next come degreasing and a conveyor trip to finishing

Where Wood and Metal Meet

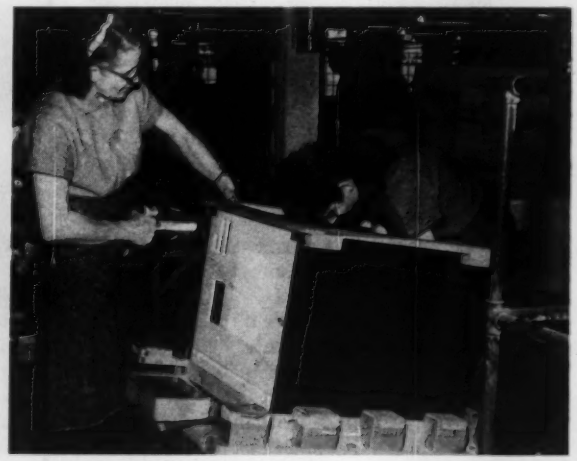
METALWORKING and woodworking team up to produce a TV receiver cabinet at GE's Rockford, Ill., cabinet plant. The mixed product has definite manufacturing and cost advantages.

The company's Electronic Components Department, which operates the 300,000-sq-ft plant, finds the wood-metal cabinet combines many of the best features of all-metal and all-wood cabinets also produced there.

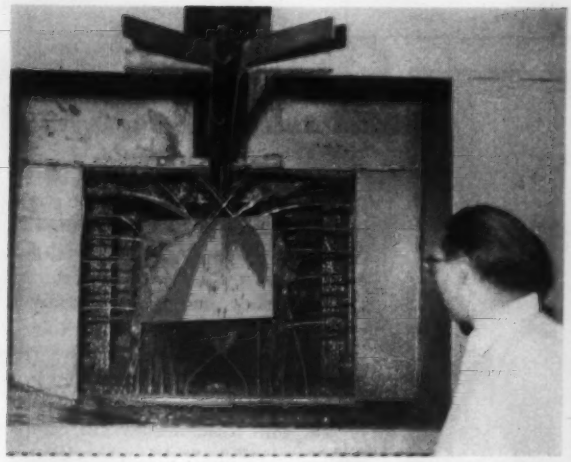
Manufacturing costs are substantially less than for an all-wood cabinet. Tooling costs may run



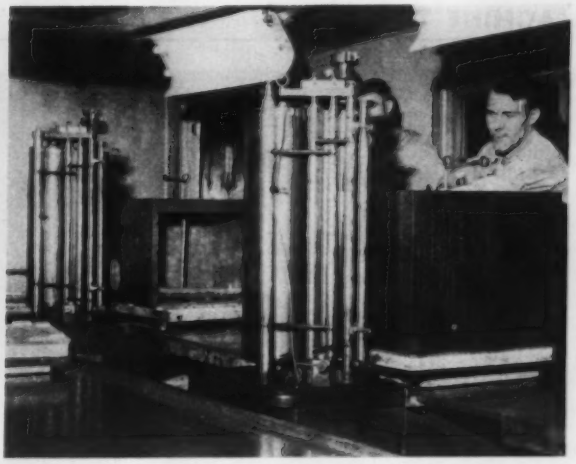
5. Shells receive their clear scuff and stain resistant finish in this electrostatic paint station. Negative ground on the shells attracts the spray to form an even coat



6. Typical assembly procedure includes installation of wood front frame and bottom plywood shelf. Square wood jig (top) holds shell and parts true during assembly



3. Prime finish coat is applied in this conveyorized Flo-Coat tunnel. Shells move through a flow-out area into a bake-out oven area where the finish is dried at 310° F



4. Shells travel on a conveyor to this roller-grain room for the simulated wood finish. Then they are reloaded on an overhead conveyor for the trip through the paint station

only about half those for an all-metal cabinet. The tooling cost reduction is an advantage for the comparatively short runs on some models.

Metal—The 20-gage steel sheets which will form the one-piece top-and-sides shell are punched, bent and folded. Brackets and supports are spot welded. Then the shells are degreased.

Overhead conveyors carry the shells through a 100-ft Flo-Coat paint tunnel for a prime coat and baking, then to stations where a simulated wood finish is applied by rollers, producing a grained effect.

Finally, a scuff and stain-resistant finish is applied automatically with a Ransburg electrostatic paint installation as the shells ride an overhead conveyor around a circular finishing area.

Wood — In another part of the plant, plywood shelves for the cabinet bottom and the wood frames for the cabinet fronts are being formed, trimmed, routed and sanded by machines. Front frames are assembled and dried on a revolving carrier.

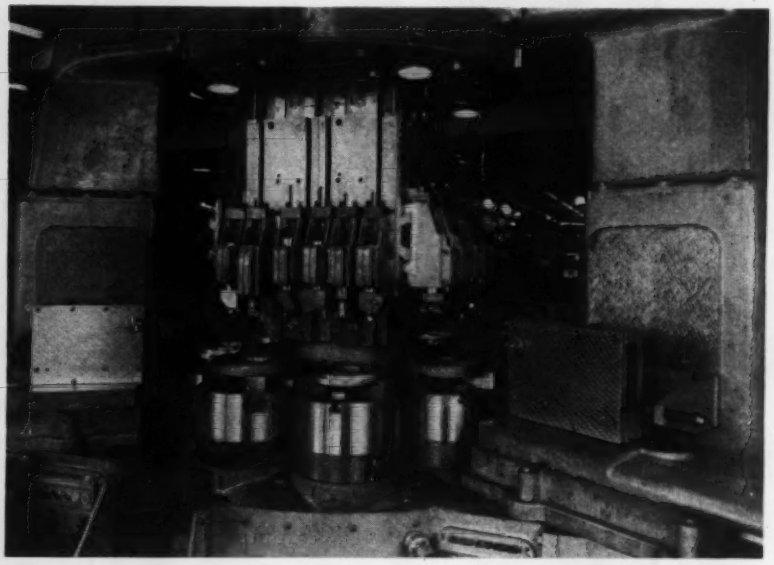
In a typical assembly of wood and metal parts, the metal shell is held in a jig with the wooden shelf and frame, while the parts are fastened with sheet metal screws.

Match Up—Final finishing, to assure that the wood finish will match that of the roller-grained metal, includes staining, filling, sealing, sanding and spraying the front frame.

Finally, the cabinets are shipped empty to TV receiver plants. There the cabinet back is added following installation of the TV chassis and picture tube.

7. Assembled cabinets move, two to a pallet, past a finishing station. To match the front frame finish to the simulated wood finish on the metal shell, sealer is applied

8. Final shading with a hand spray gun makes sure that wood front frame will match the simulated wood metal shell. Cabinets go to other plants for chassis installation



Based on an English design, this 8-spindle automatic chucking machine has 14-in. capacity chucks, eight turning slides and four cross slides. Built by National Acme Co., Cleveland, the machine has an unusual heavy support arch that runs from the base to the top of the column

English Machine Brought to U.S.

Shown in Milan, Italy, an 8-spindle vertical chucking machine caught the eye of an American builder. Result: His company is building it under license

IN September, 1954, a tall (6 ft 2 in.) American machine tool builder stood in the middle of the huge machine tool show at Milan, Italy. Ignoring crowds shoving past him, he stared intently at a busy machine being put through its paces.

What had caught and held his attention was a vertical, multiple-spindle automatic chucking machine being introduced by Thomas Ryder & Son Ltd., Bolton, England. Well acquainted with Ryder machine tools, Robert R. Rhodehamel, general sales manager, National Acme Co., figured this one was different. He was sure it could be competitive in the U.S. machine tool market.

Silence, Then "Yes" — Over a cup of coffee with Richard Ryder, general manager of the English builder, he found that not only did the Englishman agree the machine would be a natural for the American market, but that Ryder would welcome a National Acme bid to build it here.

When Mr. Rhodehamel returned to his plant, he showed an armload of brochures to Fred H. Chapin, National Acme's president. Mr. Chapin looked and listened, but gave no comment.

The next morning, though, he admitted he had spent most of the night thinking about the proposition. His decision: "Get it."

Under Way—Within three weeks, Mr. Ryder was in the Cleveland builder's plant with assembly drawings. According to Mr. Rhodehamel, they spent practically no time working out the details of the contract. Ryder will be paid an established engineering service fee on every machine National Acme sells. The fee is figured as a percentage of the base price. In return, Ryder will serve as an engineering consultant.

At this stage, the negotiations were on features, attachments and an appraisal of available production facilities in the Cleveland plant.

Going—By March, 1955, complete drawings of the machine were in the hands of Acme engineers for modification. Since British blueprints are drawn backwards (to us), they had to be redrawn.

Hydraulic, electrical and tolerance specifications had to be respecified. Mr. Rhodehamel says Acme also: "Increased practically all wall thicknesses for more 'beef,' upped shaft diameters where possible and put in splines instead of keyways. We also specified 23-per-cent steel in the castings for bases and slides to give us better wearing qualities."

Near Miss—The first of the new multiple-spindle chuckers came within two weeks of making the Chicago machine tool show. Since then, it has been run, torn down, modified and re-run in the plant. Lever-operated chucks are now pushbutton controlled. Windows, for maintenance, are larger and easier to get at. A warning light has been lowered to eye level.

Plans—More than 50 potential customers have watched the machine run. From their reaction, Mr. Rhodehamel is sure it has a good future. It will sell for $95,000 (see page 27).

He'd like to keep the first model in his plant, and use it on a long-run job for a complete test run.

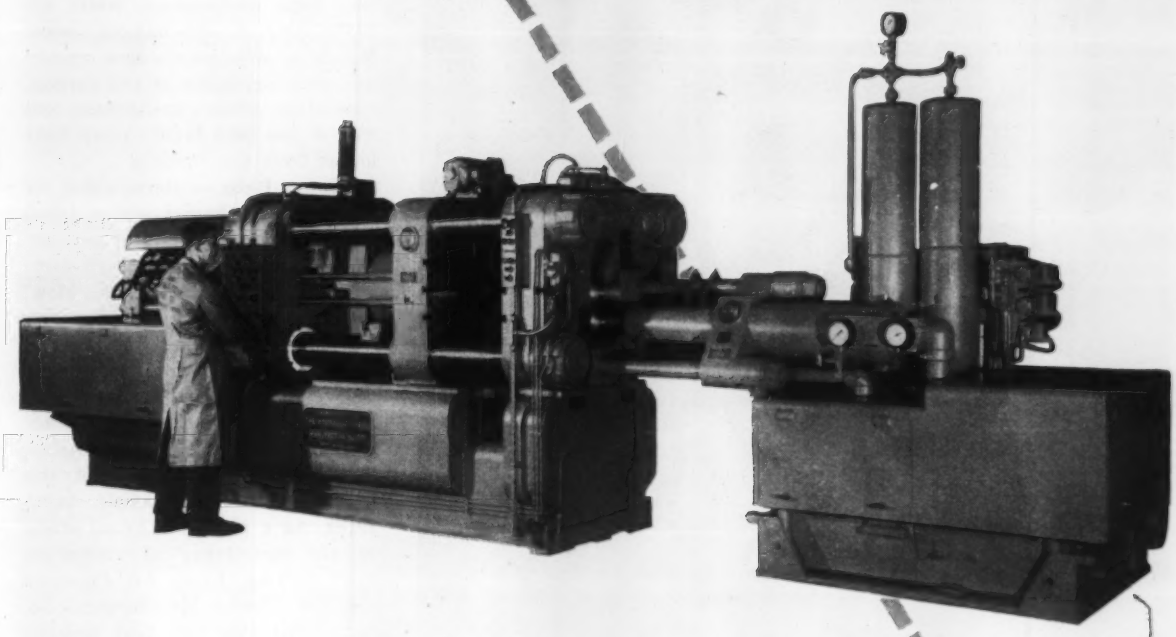
He admits, however, that if a customer comes in and demands immediate delivery, he'll sell. Otherwise, he can deliver sometime in the first quarter of 1957.

Computer Range Grows

Carboloy Department, GE, says its machinability computer now can be used to solve milling, forming, grooving and other plunge-cut machining problems (see STEEL, June 13, 1955, p. 137).

The new operating information goes with purchased computers. It shows how tool life settings can be adjusted to get the milling information, despite the fact each cutter tooth dwells in the cut for part of a revolution.

THE INCOMPARABLE H-P-M DIE CASTER



First Completely New Die Casting Machine In 15 Years

This new machine is the answer to many of today's die casting problems . . . cleaner castings . . . negligible scrap . . . better dimensional control with production output to meet any job requirement. It's time proved through four years of development with one year acceptance in the field.

H-P-M's all new hydraulic-mechanical link wedge clamp and new design injection end result in a brand new approach to die casting technique. Accurate closing of mold eliminates excessive flash. The new clamp has plenty of "beef"—clamp locks mold firmly to at least the rated tonnage and "beef" limits die parting on overload during metal injection. The new injection end has unlimited motion control . . . exceptionally high speed. Get the complete story on this new H-P-M before you buy. You'll be glad you did.

Write today for complete specifications for the new H-P-M die casting machines. Available in a range of sizes from 200 to 1500 ton capacities.

DIE CASTING DIVISION
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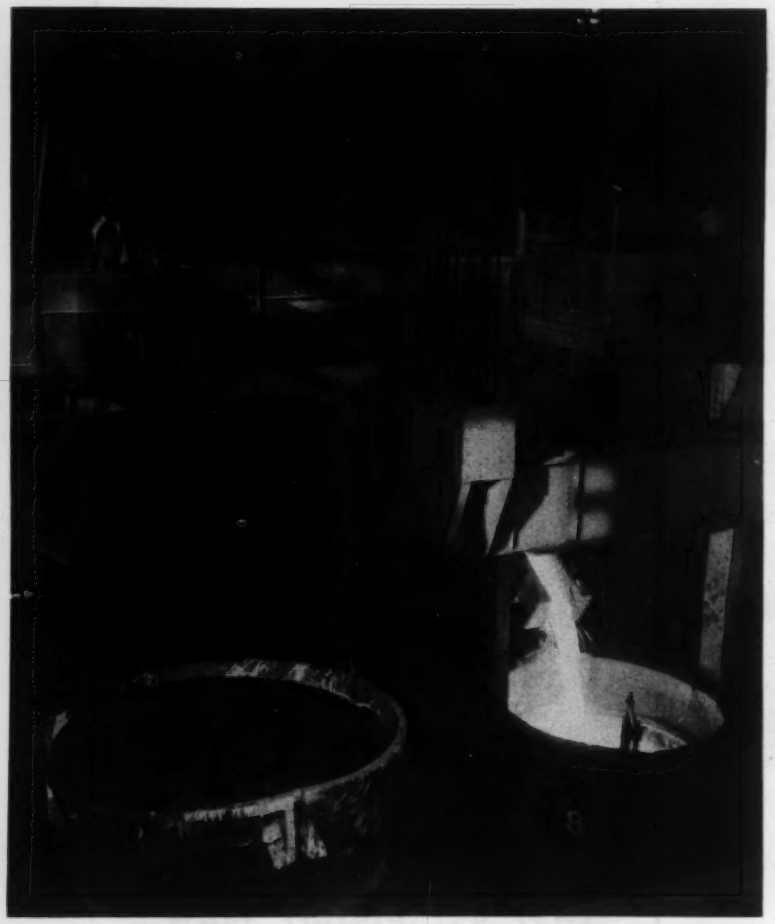


Economies in Making Stainless

Studies on oxygen input rates reported by G. W. Healy and D. C. Hilty, Electro Metallurgical Co. at AIME meeting provide a basis for cheaper melting practices for stainless steel

Mr. Healy is metallurgical engineer, product and process development department, and Mr. Hilty is manager, research information at Electro Metallurgical Co.'s Metals Research Laboratories, Niagara Falls, N. Y.

TWO IMPORTANT points in making stainless steel are the utilization of stainless scrap and the recovery of chromium and other metallic values from the initial charge.

When a heat of chromium steel is decarburized, there is usually considerable metallic oxidation. Since recovery of this oxidized metal may take substantial time and materials for slag reduction, it's good practice to hold oxidation to the minimum in line with good operating methods.

Compromise — Fig. 1 (right) shows that higher temperatures after the oxygen blow give less metallic oxidation. But the desire to use high temperatures is tempered by practical operating conditions.

This is because excessively high temperatures or prolonged operation at moderately high temperatures may damage furnace refractories. It means the operator must compromise: He must use the shortest oxidizing period at the highest practical temperature.

The most effective tool for getting high temperature while decarburizing is the oxygen lance. But to be effective the heat resulting from oxidation of the carbon, chromium, silicon, manganese and iron in the bath must exceed heat losses from the furnace.

Faster Rate — Recognition of this principle has caused a trend toward faster injection of oxygen. One proposal is for a high temperature at the start of the blow, or a high rate of oxygen input, as a means of getting the desired carbon level with high chromium recovery.

But development of best practice has been hampered because of limited understanding of the specific effects of oxygen input rates. As a part of a broad study of the metallurgy of chromium steel melting, Linde Air Products Co. and Electro Metallurgical Co. have evaluated the heat balance during the oxidizing period in terms of oxygen input rate.

Factors such as temperature increase, metallic oxidation and oxygen utilization were evaluated and extrapolated to include a wide range of furnace sizes.

Results—Studies showed that, in general, higher oxygen input rates give: 1. Shorter oxidation

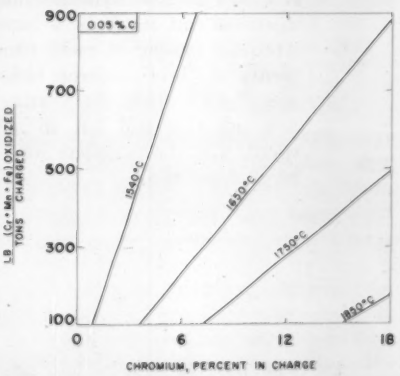
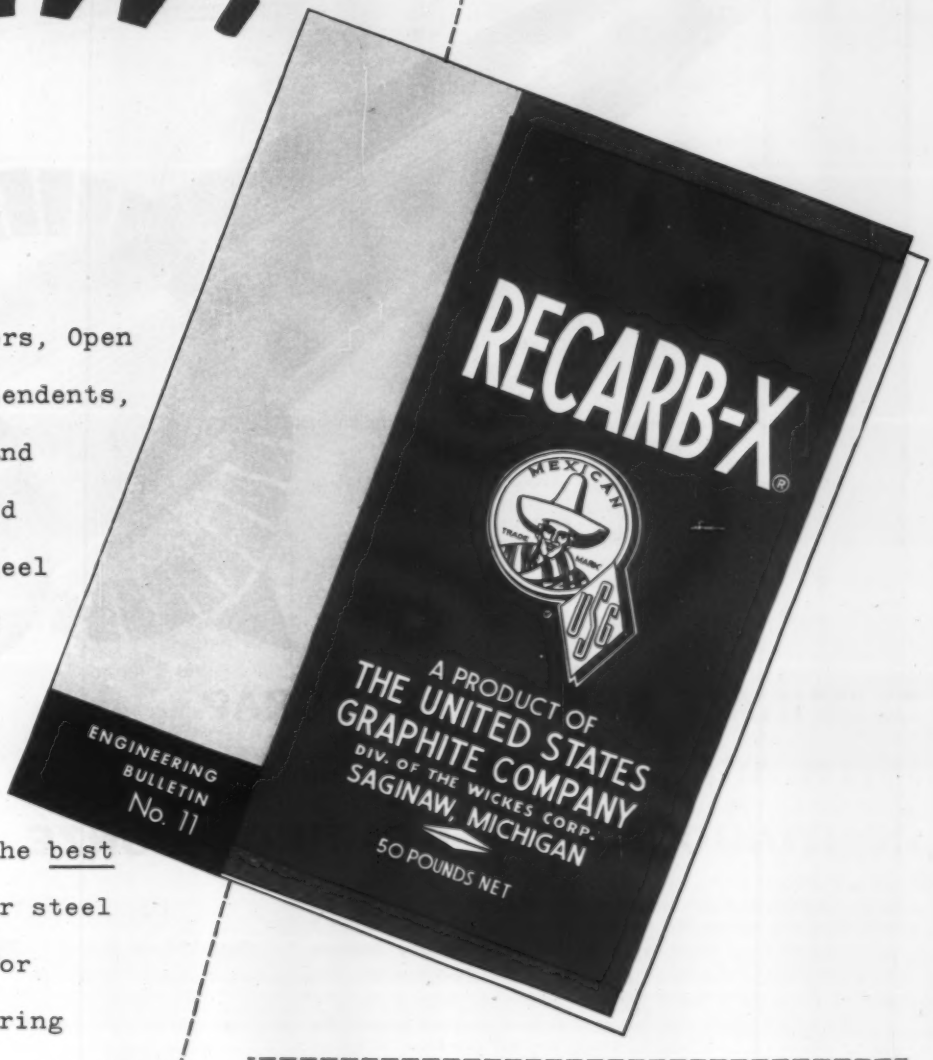


Fig. 1—How temperature affects metallic oxidation in decarburizing chromium steel heats to 0.05 per cent carbon

NEW!

a memo to Melters, Open Hearth Superintendents, Metallurgists and others concerned with quality steel making . . . If you haven't tried RECARB-X and want the full facts on the best recarburizer for steel making, write for the new Engineering Bulletin No. 11, use the convenient coupon below.



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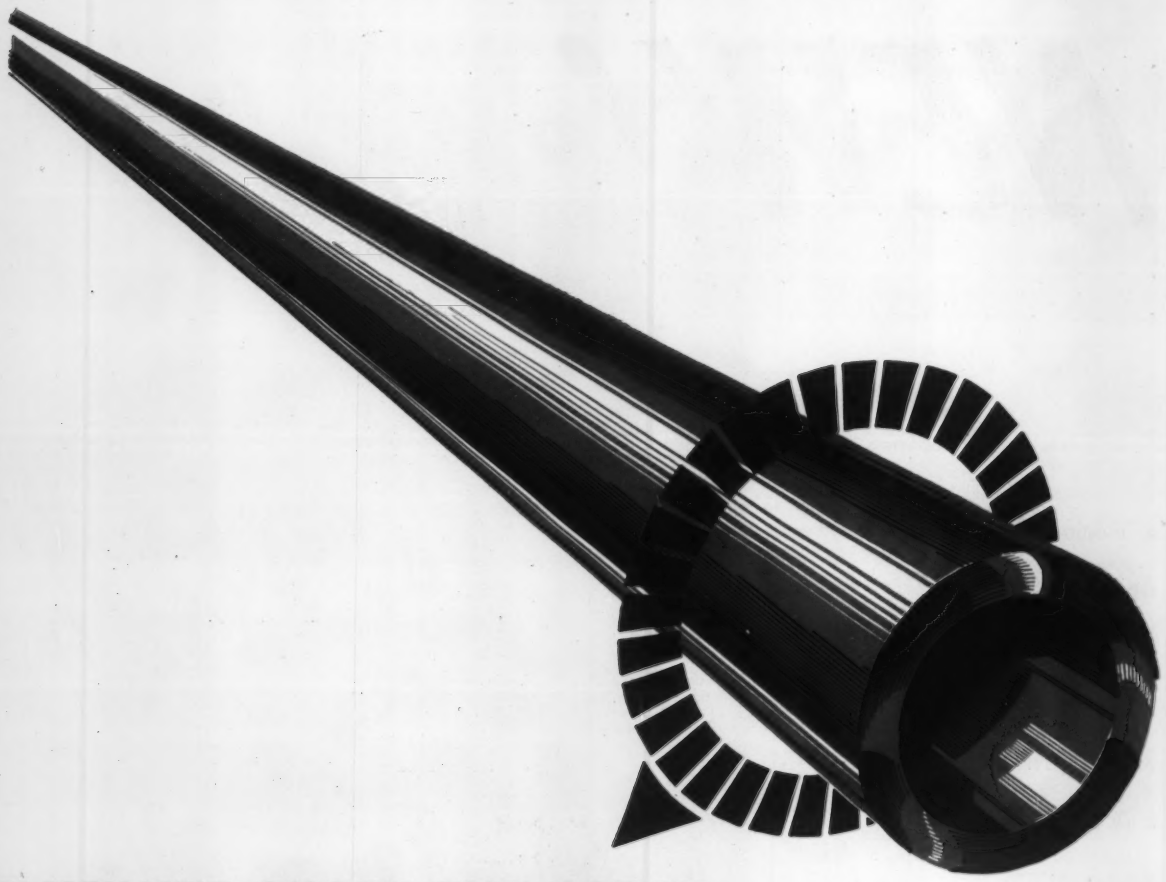

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Diameters of Asarcon Bronzes now range from ½ inch to 9 inches in any size you need. Many foundry alloys and a variety of shapes are made to order in all of these sizes. Asarcon 773 can be shipped directly from distributors' stocks or from our New Jersey and Indiana plants.

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AMERICAN SMELTING AND REFINING COMPANY

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IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal

ASARCO

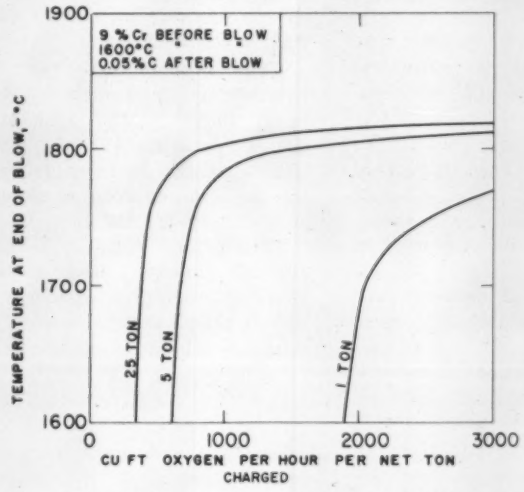

Fig. 2—How blowing rate and furnace size affect final temperature. For these curves and others following, bath is decarburized to 0.05 per cent carbon

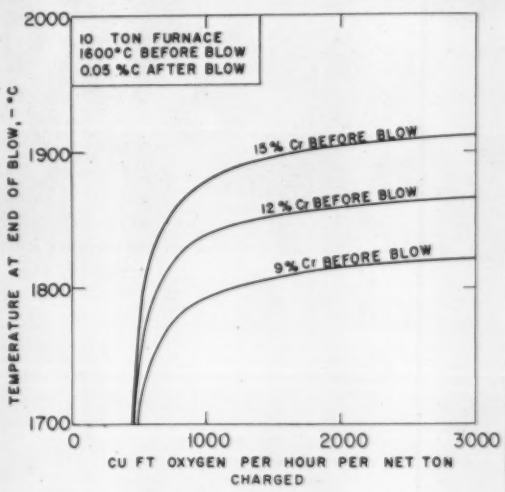

Fig. 3—How blowing rate and starting chromium content affect final temperature

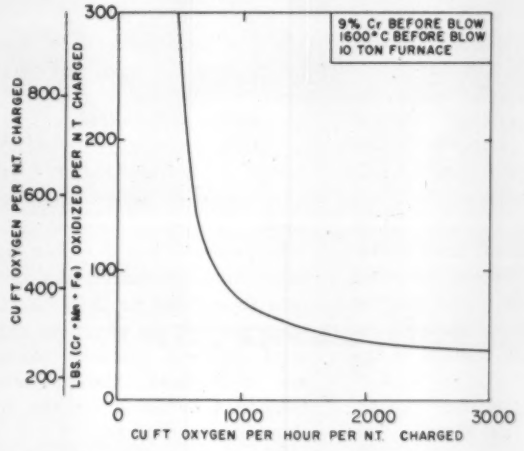

Fig. 4—How blowing rate affects metallic oxidation and oxygen used

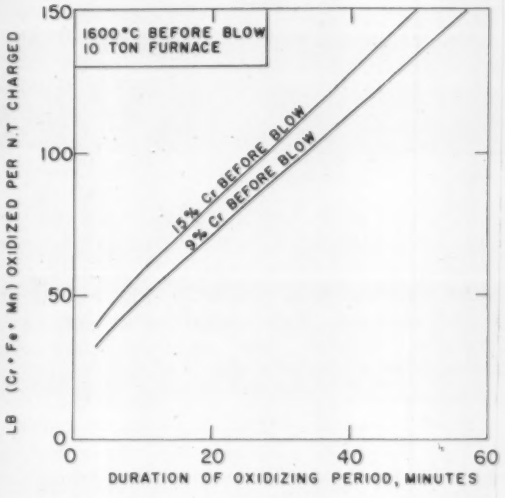

Fig. 5—How time and starting chromium content affect metallic oxidation

periods. 2. Lower oxygen consumption. 3. Less oxidation of chromium and other metallic values. 4. Higher bath temperatures.

But there is a critical oxygen input rate that must be exceeded if effective decarburization is to be realized. As the furnace size increases, the critical input rate per unit weight of the charge decreases. This means that practical input rates may be realized for large furnaces.

At high oxygen rates, temperature reached for the bath becomes relatively insensitive to further increases in rate. The major effect of still higher input rates is to reduce the time the heat is held at a high temperature. This helps refractory life.

For a given rate of oxygen input, lower temperatures at the start of the oxidizing increase duration of the oxidizing period, meaning that chromium, manganese and iron go into the slag.

Higher chromium contents in the charge also increase the length of the oxidizing period and up metallic oxidation.

Data—Now let's look at some of the results the studies brought out.

Fig. 2 shows the effect of oxygen input rate on the bath temperature at the end of the oxidizing period for three different furnace sizes. Note two important points: First, the blowing rate has a critical lower limit. If the oxygen input rate does not exceed this, the bath will lose temperature or fail to decarburize. Sec-

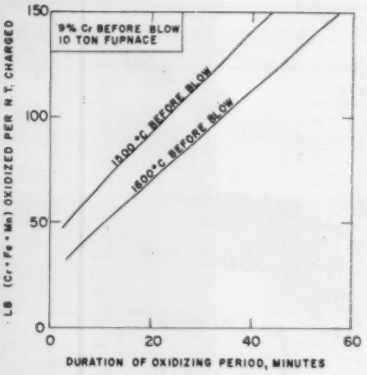
9% Cr BEFORE BLOW
10 TON FURNACE
1500°C BEFORE BLOW
1600°C BEFORE BLOW
LB (Cr • Fe • Mn) OXIDIZED PER N.T. CHARGED
DURATION OF OXIDIZING PERIOD, MINUTES

Fig. 6—How time and initial temperature affect metallic oxidation

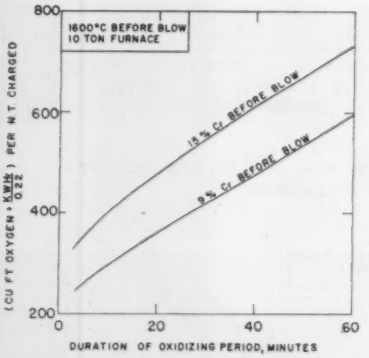
1600°C BEFORE BLOW
10 TON FURNACE
15% Cr BEFORE BLOW
9% Cr BEFORE BLOW
(CU FT OXYGEN • KWH / 0.22) PER N.T. CHARGED
DURATION OF OXIDIZING PERIOD, MINUTES

Fig. 7—How initial chromium content affects length of oxidizing period

ond, the curve flattens at the higher blowing rate. This means that high blowing rates do not give proportionally high bath temperatures, if the blow is stopped when the carbon content desired is reached.

Chromium Content — Fig. 3 shows how the initial chromium content affects the relationship between the oxygen input rate and the temperature of the charge after the blow. There is little change in the critical blowing rate, but by increasing the chromium content in the charge, temperature at the end of the oxidizing period is substantially raised.

Blowing Rate—The amount of metallic oxidation (and likewise oxygen consumption) is markedly influenced by the blowing rate, as shown in Fig. 4.

Near the critical blowing rate, a large fraction of the bath must be oxidized before the desired carbon level is reached. Naturally, this reduces chromium recovery. However, higher rates of oxygen input substantially reduce metallic oxidation and oxygen consumption.

Fig. 4 suggests that the theoretical minimum of metallic oxidation and oxygen used may be reached with blowing rates that are practical.

Time—The same effect is shown in Fig. 5, where oxidation is plotted against time (rather than rate as in Fig. 4), to emphasize that the total length of the oxidizing period is important—not merely the time during which the oxygen is being injected.

Another point is brought out in Fig. 5: The effect of time oxidation for two different starting chromium contents. The curves show that metallic oxidation goes up as the chromium content of the charge increases.

Note that this confirms the effect brought out in Fig. 3: The higher temperatures that result from higher chromium in the charge are due to greater oxidation of the bath.

False Economy—A lower temperature at the beginning of the blow increases the amount of metallic oxidation (Fig. 6). Oxidation increases 30 lb or more per ton for a lower starting temperature of 100° C (212° F).

This points a finger cost-wise at the practice used in some shops of starting oxygen injection before the charge is melted. The time saved by starting the oxygen blow early must be paid for by a longer oxidizing period. The increased oxidation will require more time and materials in the reducing period of the heat.

Chromium — The increase in time and energy input at any given blowing rate caused by higher chromium in the charge is shown in Fig. 7.

These curves also suggest that in cases where the oxygen blow may be interrupted or delayed for any reason (such as by changing lances or taking samples), the use of electrical power is desirable to avoid a prolonged oxidizing period with consequent increase in metallic oxidation and oxygen used.

Examples 1 and 2 (table below) show how increasing the oxygen rate from 1000 to 2000 cu ft per hour per net ton saves on oxygen used, reduces metallic oxidation and cuts time. Similar calculations can be made for the conditions in your plant.

Advantages of Higher Oxygen Input Rate

Examples below show that upping oxygen rate from 1000 to 2000 cu ft per hr per net ton of charge decreases the oxygen used 25 per cent, reduces metallic oxidation 40 per cent and cuts time 65 per cent. Although the final bath temperature is up 20° C (68° F), this added temperature is more than offset by the shorter time the bath was at maximum temperature.

	Oxygen Input Rate cu ft/hr/NT Charged	Time Required Min.	Oxygen Required cu ft/NT Charged	Fe-Cr-Mn Oxidized lb/NT Charged	Temperature Attained deg. C	Cr Content of Bath After Blow—Pct.
EXAMPLE I: 9% Chromium at start	1000	22	370	76	1800 (3272° F)	6.7
	2000	8	275	43	1820 (3308° F)	7.7
EXAMPLE II: 15% Chromium at start	1000	34	565	115	1880 (3416° F)	11.2
	2000	13	430	68	1900 (3452° F)	12.9

Conditions: 10 ton furnace
Temperature at start of oxidizing period—1600° C (2912° F)
Carbon at end of oxidizing period—0.05%

PHOTO COURTESY JONES & LAUGHLIN STEEL CORP.

Want more hot metal . . . right now?

How do you break through the "capacity barrier" and boost iron production without increasing plant capitalization?

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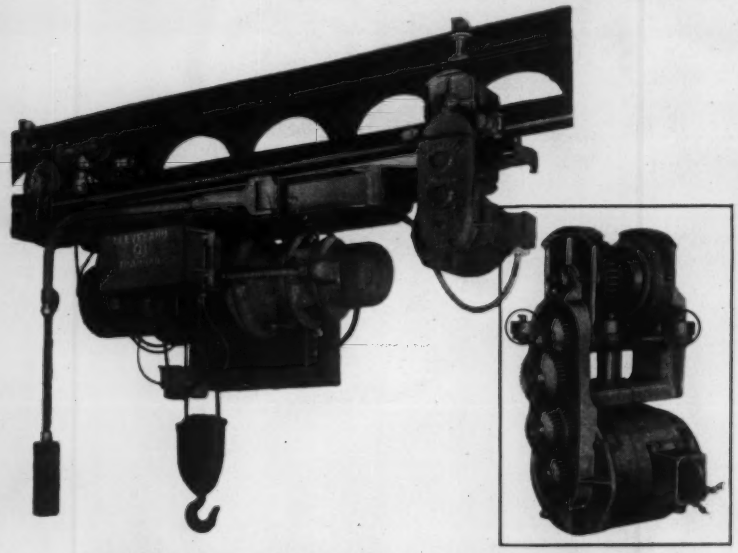


CLEVELAND TRAMRAIL GUIDES MOTOR HEADS ON McGILL CAMROL BEARINGS

Motor-driven electric hoist carriers made by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Company, incorporate McGill CAMROL Cam Follower bearings as side guide rollers for the motor head.

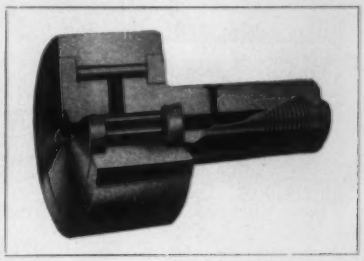
The CF bearings keep the motor head square on the monorail track used in this system and guide the head around curves. Moving on the rails at speeds up to 250 feet per minute, the bearings take the thrust load when entering into a curve.

Replacing spring loaded friction type bolt and roller units, the simplicity of mounting and the friction-free operation of the CAMROL cam followers provide dependable, trouble-free operation of the carrier assembly. Used almost six years, bearing performance has been most satisfactory.

Fact-packed Bearing Catalog

Write for your copy of Catalog No. 52, a revised 140-page Bearing Selection Guide. It contains vital product information and 30 pages of engineering data.

CAMROL BEARINGS DIRECT ACCURATE CAM ACTION



Precision built throughout, CAMROL CF Bearings are designed to add the advantages of smooth accurate cam action to rugged shock-absorbing dependability in any type cam follower application. An interchangeable sealed SCF series protects critical installations.

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Eighteen foot propeller shafts and other large work are supported and guided accurately on Lodge and Shipley Lathes through use of Camrol CYR Bearings. The Lodge and Shipley Company has standardized on these heavy duty Cam Yoke Roller Bearings for the Roller Jaw Steady Rest on their larger Engine Lathes. Four CYR bearings are mounted in a yoke at the ends of adjustable slides to provide dependable, precision support for a variety of work.

CAMROL CYR Series Adapts To Yoke Mounting

Internal construction of the CYR Series bearing is similar to that of a CF Series bearing with a heavy outer ring selection to withstand shock load. However, the stud is replaced by an inner ring for receiving shaft in a yoke mounting.

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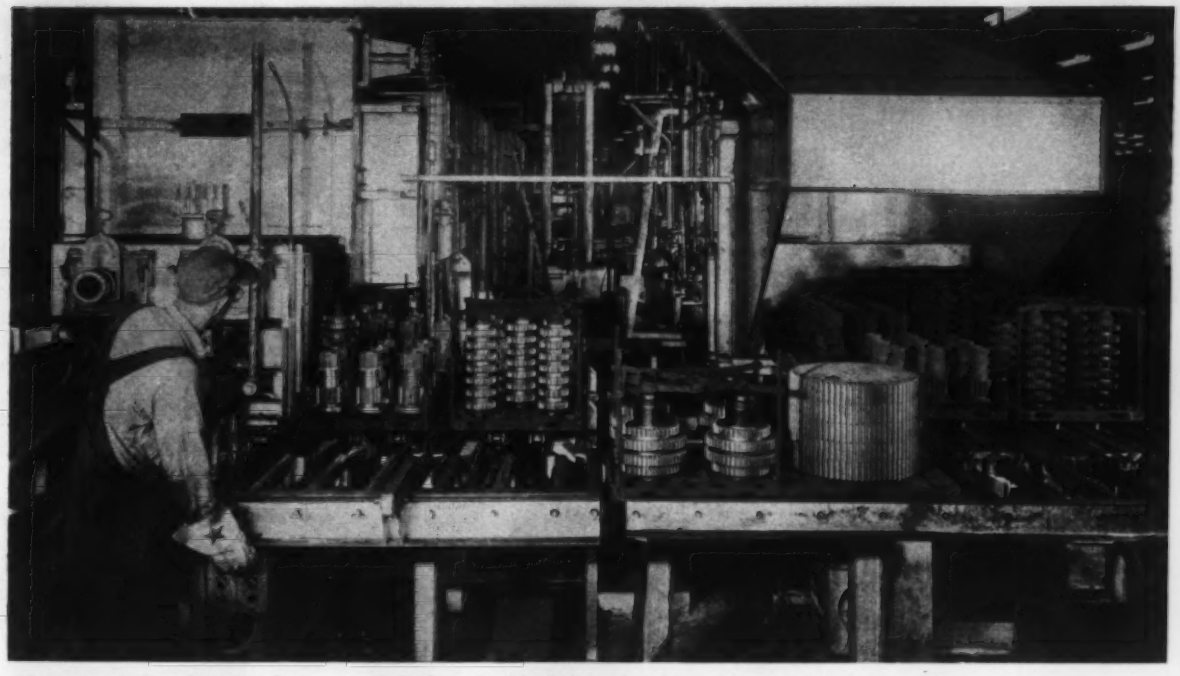


Charge end of carburizing furnace and discharge end of draw furnace. Note variety of gears which are carburized in the installation

Automated Furnace with Flexibility

By R. C. SMITH
Metallurgist
J. I. Case Tractor Works
Racine, Wis.

A SINGLE furnace installation at the J. I. Case Tractor Works provides three methods of carburizing gears—automatic or direct quench, press quench or a combination of the two.

Built by Holcroft & Co., Detroit, the installation consists of the carburizing furnace, quench tank, rinse and wash and a recirculating draw furnace.

Furnace — The gas carburizing furnace is a two-row tray pusher type unit that accommodates 44 trays of gears. Both rows can be operated on automatic quench, both on press quench, or one of the rows on press quench and the other on automatic quench.

This flexibility is important. We often process a variety of gears at the same time. Ring gears require a press quench; others, such as cluster and bevel gears, can be direct quenched. Processing both at the same time provides a steady volume of production.

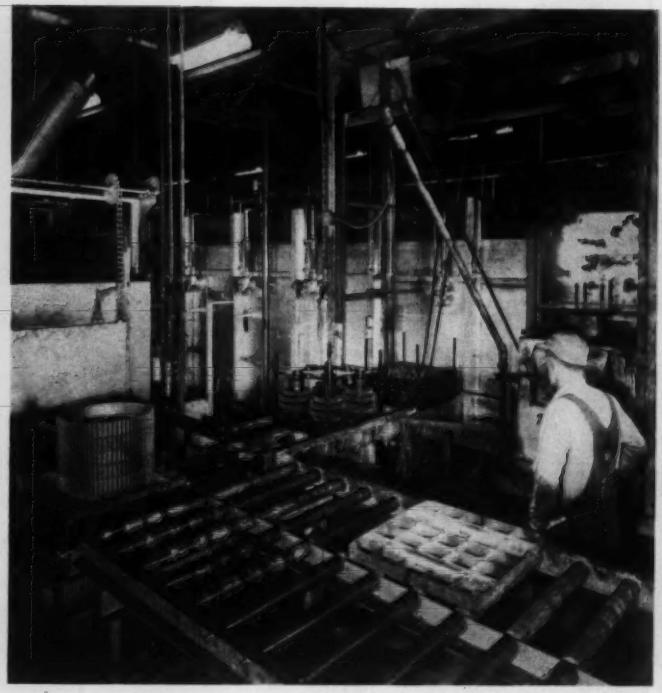
Burners — The carburizing furnace has 29 closed head design, radiant tube burners. Heat is maintained at 1680°F in four zones. The fifth, or quenching zone, is held at 1580°F. Capacity of the furnace is 1720 lb an hour gross, based on 11 hours in the furnace. Gears are carburized to a case depth of 0.055-in.; carbon is 0.40 per cent.

The draw furnace operates at 325°F; gross capacity also is 1720 lb per hour. Time in the draw furnace is 3½ hours. It is heated with two gas-fired recirculating heaters equipped with two recirculating fans for two-zone control. One tray of gears passes through the complete installation every 15 minutes.

Automatic Quench — Gears go through the furnace and automatically enter the quench tank vestibule. A pinion-operated pushout mechanism moves the tray into position on the quench elevator. After the pushout mechanism reverses and the discharge door closes, the quench elevator lowers the tray into the quenching oil.

While the gears are quenching, the inner charge door opens and a pusher mechanism advances all trays in one row. When the timer makes contact, the quench elevator raises the tray of quenched stock and a dog rail transfer unit moves the tray into position at the charge end of the wash, rinse and draw furnace line. The elevator then is repositioned automatically for the next tray.

When the timer contacts for the second time, these operations are repeated for the tray at the head of the second row. In addition, all trays are advanced one position through the wash, rinse and



In direct quench operation, stock comes out of oil quench and is transferred automatically to the wash and draw line

For press quenching, gears are removed from the slot door individually

draw cycle as soon as two trays are in position at the charge end of the wash unit. At this time, the operator loads the charge carriage and initiates the automatic flow of the trays.

Press Quench—When ring gears must be press quenched to prevent distortion, the trays process from the carburizing furnace to a position in front of a slot positioning door. This door allows the gears to be taken one at a time for the press quench operation. Height of the door opening automatically adjusts to the height of the gear.

As trays in the first row reach a position in front of the door, the operator opens the slot which is positioned by a selector switch to the exact height necessary for removal of the top gear from the tray. Each gear is placed in the die and press quenched individually. The slot door adjusts itself automatically for each succeeding gear until all gears have been removed from the tray. The empty tray is placed in the return line where it travels to the loading point for the carburizing furnace. Trays in the second row travel through the same operation with the addition of a sideward movement to bring them into position in front of the slot positioning door.

Low Heat Loss — Gears are stacked six high in the trays for a press quench operation. Over-all maximum height, for the ring gears, is 14 in. Gears weigh 45 lb each.

The slot doors are built up of an inner and outer unit. The inner section is insulated; the outer section, which forms the gas seal, slides on a water-cooled wear plate. The door is raised and lowered to proper height by a selector switch through a screw drive. The insulated component forms a substantial heat barrier to minimize heat losses.

Combination Quench — When a double work flow is necessary because of the variety of gears being processed together, the trays of gears in row 1 follow the press quench flow. At the same time, row 2 progresses through the automatic cycle quenching the entire tray of gears at one time. Any of these cycles can be put into operation by turning a selector switch.

The quench tank in the installation is equipped with recirculating pump which operates when gears are being quenched. A circulating pump moves oil through the heat exchanger and to the quenching presses. The recirculating pump provides sufficient oil agitation to promote efficient and uniform quenching of mass loads.

Atmosphere — Carburizing atmosphere is composed of natural gas and generator gas introduced to the furnace chamber in metered amounts through nine gas inlets. These are arranged so the hydrocarbon is delivered in quantities governed by the demand of work in progress through the furnace chamber. Surface carbon concentration is held from 0.9 to 1.0 per cent.

Generator gas is supplied by a Holcroft dual retort endothermic gas generator. Maximum capacity of the unit is 4000 cfh, operating at 1850°F. In operation, one retort is sufficient to supply the required amount of atmosphere generator gas, while the other retort is on stand-by. It is possible to burn out one retort while operating the other.

THE TREND TO CECO-DROPS...

JAMESTOWN, N. Y.

SITUATION: Growing sales were taxing production capacity of tool mfr's. forge shop. Had four belt-driven board drop hammers.

SOLUTION: Four Ceco-Drops now in operation —have been giving excellent service. Production is up—maintenance is down. "3 hours charged against Ceco-Drops in 42 days" —"One Ceco-Drop ran 108 hrs. (21 days) without maintenance or die work."

ALLENTOWN, PA.

SITUATION: Tool works had the problem of keeping 23 "old dog" board drop hammers operating profitably. Had but one recent model "J" Chambersburg Board Drop.

SOLUTION: Management launched a modernization program calling for nine Ceco-Drops capable of producing a yearly tonnage in excess of the 23 old board drop hammers. Four of the Ceco-Drops are now in operation, shop layout has been revised. Efficiency and production methods have been improved.

SKOKIE, ILL.

SITUATION: One of largest manufacturers of hand tools is planning a new shop. Decided to have modern Gravity Drop Hammers.

SOLUTION: Selected Ceco-Drops, and on a programmed basis is replacing board drop hammers with Ceco-Drops. To date, two 2,000 lb. Ceco-Drops and one 2,500 lb. Ceco-Drop are in operation — "Doing fine". Another 2,500 lb. Ceco-Drop on order.

FLINT, MICH.

SITUATION: Large Auto Co. with 16 Board Drop Hammers—(7 of them Chambersburg "J's")—ranging in age from 7 to 30 years. Lowered production rates and mounting maintenance costs.

SOLUTION: Started modernization in 1953. Converted* four "J's" with Ceco-Drop upper works. Cost and down time reduced —production up—operators like them. Other "J's" to be converted*. Ceco-Drops will replace older board hammers.

*Saves cost of anvil and foundation!

COLUMBUS, O.

SITUATION: Job shop with 5 Board Drop Hammers finds equipment obsolete—cannot compete with lower prices and higher production of other more modern shops.

SOLUTION: Initiated 10 year program of modernization to include 15 Ceco-Drops. Three Ceco-Drops already installed to replace board drop hammers.

The gravity drop hammer with short stroke control

... and remember the Lansing Story?

LANSING, MICH.

Lansing, Mich. is unique among industrial cities in the concentration of drop forging activity in its many factories. It may well claim the title of "Drop Forging Capital of the World". In Lansing are six great forging shops covering 14 acres of land, with a working area of 985,579 sq. ft. All these great forging shops are using Chambersburg Ceco-Drops.

Forge Shop No. 1—installed the first Ceco-Drop in 1947—now forging connecting rods.

Forge Shop No. 2—has installed 6 Ceco-Drops since 1950—making automotive forgings.

Forge Shop No. 3—bought 4 Ceco-Drops since 1948—Commercial and automotive forgings.

Forge Shop No. 4—bought seven Ceco-Drops in the last six years.

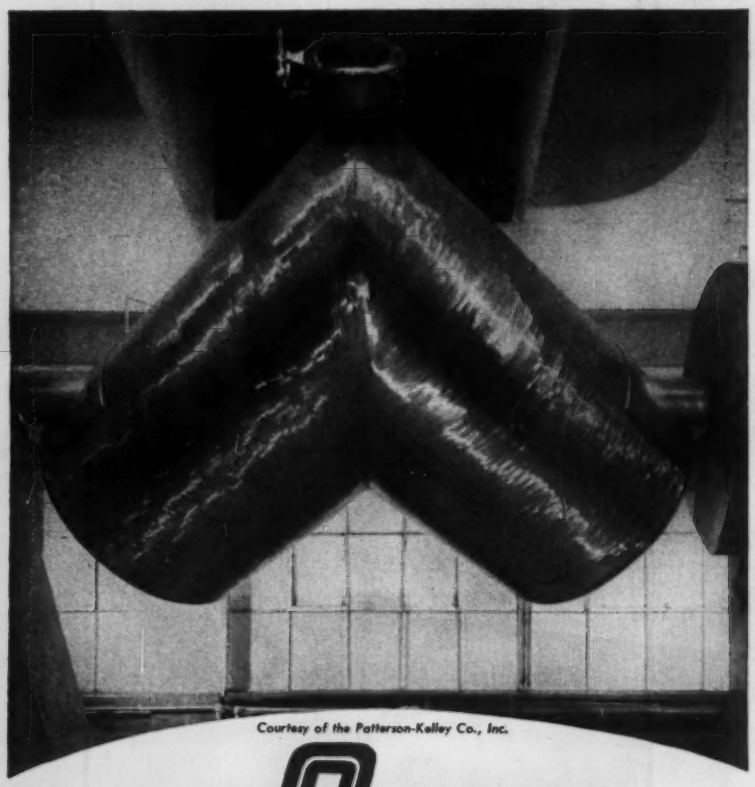
Forge Shop No. 5—Purchased 3 Ceco-Drops in 2 years.

Forge Shop No. 6—One of largest in world Installed 11 Ceco-Drops since 1951.

CHAMBERSBURG ENGINEERING CO.

CHAMBERSBURG • PENNSYLVANIA

When contamination of products cannot be tolerated

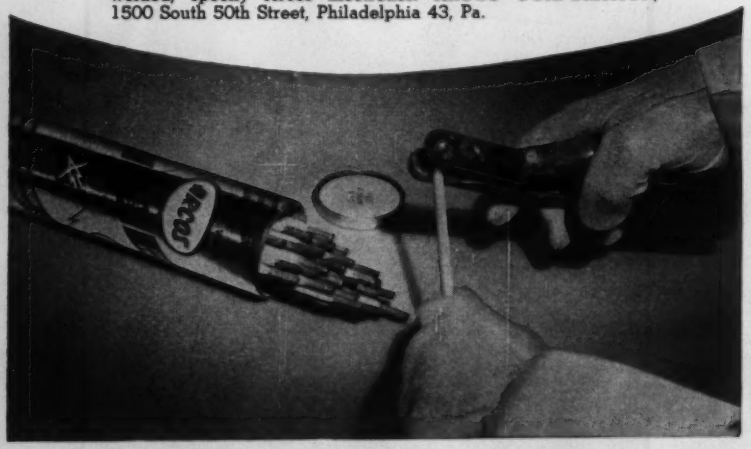


Courtesy of the Patterson-Kelley Co., Inc.

WELD WITH ARCOS

STAINLESS ELECTRODES

This precision blender is used for uniform mixing of vitamins and potent drugs with inactive materials where lack of uniformity or contamination would have serious results. The same high standard of performance is provided by the Arcos Electrodes used to weld the twin-cones. They provide smooth unbroken joints whose uniform *stainless* and sound mechanical properties are the result of conscientious quality control in their manufacture. When you want stainless welds with properties equal to the material being welded, specify Arcos Electrodes. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

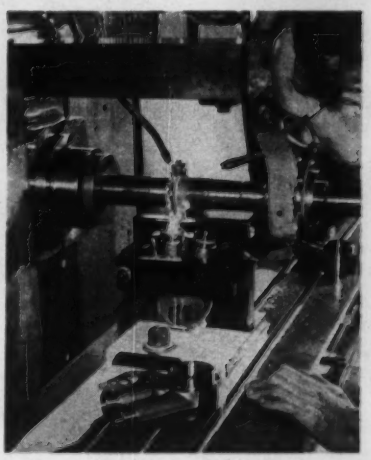


Score for Titanium

Used in bomb ejector breeches, it stands up under more than 1000 firings

TITANIUM has replaced 431 stainless in bomb ejector breeches of Navy aircraft at Douglas Aircraft's El Segundo, Calif., division.

The ejector is housed in a streamlined shape between the wing and the external store of bombs it will eject. It must be compact and light but have high strength.



PROGRESSIVE MILLING
. . . of titanium bomb ejector breeches

Heat Cracks—During test firing, Douglas engineering found that heat cracks occurred in the steel breeches of the ejector barrels and explosion chambers. Investigation revealed that the steel breeches began to split open along the forging parting line after 10 to 20 shots. Subsequent tests disclosed that the failures were caused by banded free ferrite that tended to pile up along the parting line, producing a weakened structure.

Titanium was tested as an alternate material. Forgings were made in existing dies, using Mallory-Sharon's 3Al-5Cr alloy. The alloy's tensile strength (145,000 psi) was considered to be as close to the properties of steel parts as any material available. The 431 stainless had been heat treated to 180,000 to 200,000 psi.

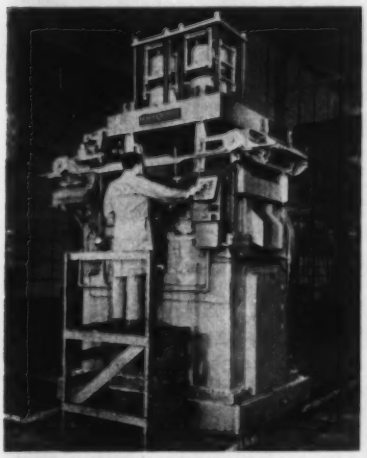
As-Forged—The titanium bars were heated to 1750° F in a stainless box to avoid scale pickup and flame impingement. They were

forged in three stages and were at about 1500° F when completed. They were machined in the as-forged condition.

(Tests showed that annealing at 1250° F for 6 hours with air cool reduced the ultimate tensile strength with little improvement in elongation. Forging at lower temperatures gave a higher yield strength and better elongation. Production parts are processed this way.)

The titanium ejectors have gone through 1000 test firings without failure. Titanium Metals' Ti-155A was established as an alternate metal.

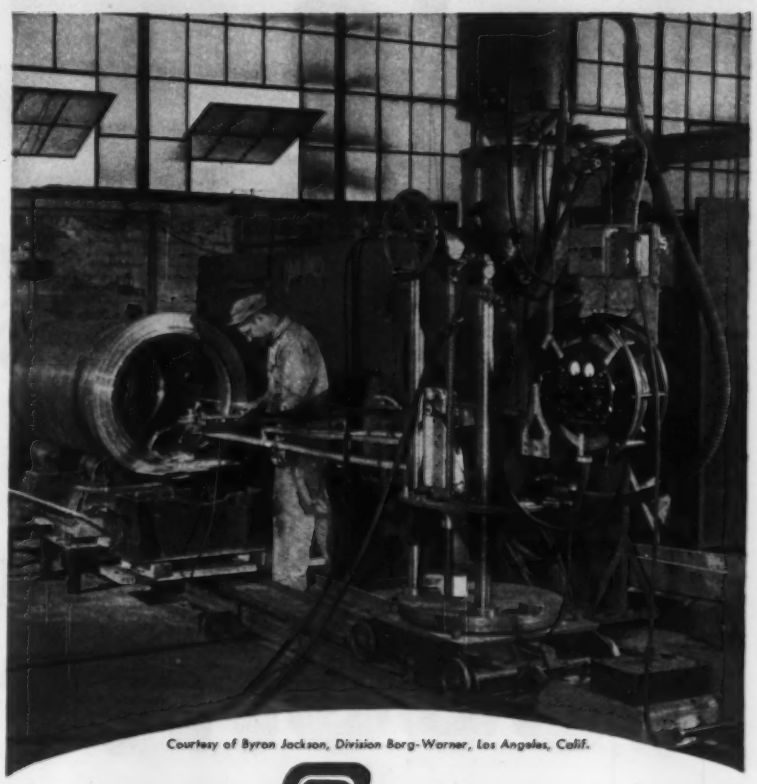
Machining—In machining titanium forgings, breech barrels are reamed with formed reamers. The main difference between machining titanium and stainless is the necessity to use back taper on the multiple-step reamers. A finish of 600 rms is produced with minor polishing. Honing is not required. Machining time for 15 operations is 20 per cent higher than for stainless. Perishable tool cost, due to the need for sharper tools, is about three times greater.



Speedy for Its Weight

This 400-ton capacity, automatic dieing machine will be used to produce truck brake parts at speeds of 45 to 90 strokes a minute. It has air cushions on the upper crosshead, double-roll feed, scrap cutter and herringbone gearing. A 60-hp motor drives through a variable speed transmission. Weighing over 112,000 lb, the machine was engineered by Henry & Wright Division, Emhart Mfg. Co., Hartford, Conn., to use large progressive dies

How to *guarantee* yourself the positive benefits of submerged arc welding

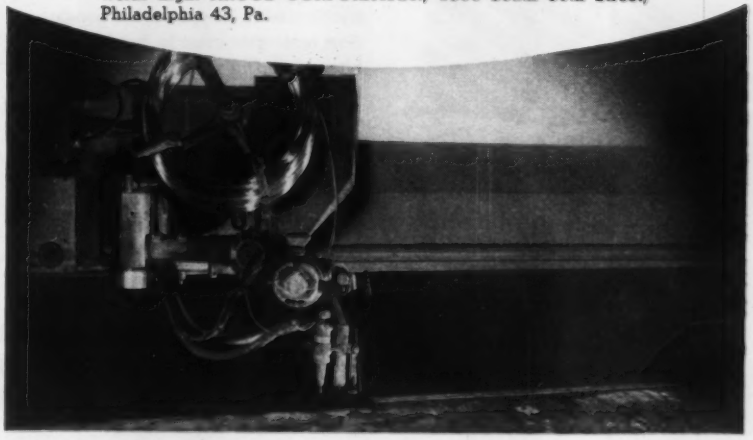


Courtesy of Byron Jackson, Division Borg-Warner, Los Angeles, Calif.

WELD WITH ARCOS

STAINLESS COILED WIRE

To save time and money, submerged arc welding was used to overlay type 308 stainless weld metal on the inside of this barrel of a boiler pump. Arcos Chromar Coiled Wire helped guarantee these savings through fast, easy deposition with minimum dilution. On your own jobs, Chromar Coiled Wire . . . *quality controlled* . . . teamed with the time-saving advantages of submerged arc welding will keep your welding costs down and the quality of your welds high. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



TOUGH!

Is your present abrasive tough enough to prove itself in performance? You can't judge an abrasive by looks, claims or promises. The only test of any abrasive is its *cost per ton of castings cleaned.* Because of exclusive metallurgical characteristics, Malleabrasive gives you the lowest cost per ton cleaned of any premium abrasive on the market! This has been proved in hundreds of production tests by users throughout the country. Prove it in your own production test—put muscle behind *your* blast cleaning with Malleabrasive! *We GUARANTEE that Malleabrasive will give you lowest cost per ton of castings cleaned.*

NOW — IN EASY TO HANDLE 50 POUND DOUBLE BURLAP BAGS

To order Malleabrasive, or for additional information on running a test, contact Globe Steel Abrasive Co., Mansfield, Ohio.

Sold and recommended by Pangborn Corporation, Hagerstown, Md.

MALLEABRASIVE®

Carbon Analyzer

MEASURING the carbon in steel within 0.0005 per cent is routine for the apparatus illustrated. With it, U. S. Steel's Research Center at Monroeville, Pa., can control the carbon in steel to extremely close specifications.

The device consists of a force pump and a mercury diffusion pump to provide the vacuum, an oxygen purifier, a combustion chamber, freezing chambers and a measuring system.

Pure Oxygen—Accurate analysis requires pure oxygen. To get it, two liquid nitrogen traps and a palladium chloride catalyst are used. During the refining, the chamber is heated to 752° F which converts hydrocarbons to carbon dioxide and water. The oxygen is recirculated three times by moving the liquid nitrogen traps from one side of the catalyst to the other. At −319° F, the liquid nitrogen freezes oxygen, creating a vacuum.

VACUUM FUSION
. . . measures carbon to 0.0005 per cent

Sampling—Steel chips and shavings are weighed and placed in a rack sealed into the vacuum system over the combustion chamber. Samples are moved by a magnet.

The combustion chamber is a platinum crucible, which is lined with aluminum oxide and induction heated to 3092° F. This burns the samples, and the carbon in the steel becomes CO_2.

This and other gases are passed through another freezing trap at −112° F. CO_2 passes through, but other gases are frozen and remain.

Liquid nitrogen is used to freeze the CO_2 which is placed in a pressure gage. Pressure indicates the amount of carbon in the steel.

WASTE on overweight cast or forged circular parts can pile up operating expenses. "Slim" Cleve-Weld welded components can cut your costs.

You save three ways on circular parts from Cleve-Weld

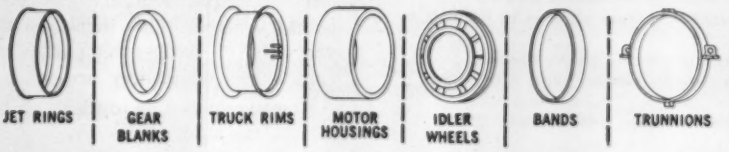
1. Waste costs are cut up to 30% over bulky cast or forged parts.
2. Finished machining time is reduced to a minimum.
3. Your overall production is speeded.

From simple gear blanks to special alloy jet rings, the Cleve-Weld Process gives the same results—better performance and reduced costs. In some cases, the savings in machining time and material waste pay for the finished Cleve-Weld part.

Find out the full story on how Cleve-Weld's 45 years of design, metallurgical and production experience can save you money, too. Write, telephone, or send drawings to: Circular Welded Products Sales Department, at the address shown below.

THIS IS THE BASIC CLEVE-WELD PROCESS. Rectangular bars or special contoured sections of steel are rolled into a circular form. Next, the part is welded and then expanded into a true circle. This tests the weld and insures accuracy. Later operations add stress relief and desired hardness.

EXAMPLES OF CLEVE-WELD PROCESS PRODUCTS



Another AMF Product
CLEVE-WELD PROCESS
RINGS · WELDMENTS

CLEVELAND WELDING DIVISION
AMERICAN MACHINE & FOUNDRY COMPANY
West 117th Street & Berea Road, Cleveland 7, Ohio

SEND THIS COUPON NOW

Cleveland Welding Division
West 117th Street and Berea Road
Cleveland 7, Ohio

Please send me your Cleve-Weld Process Brochure.

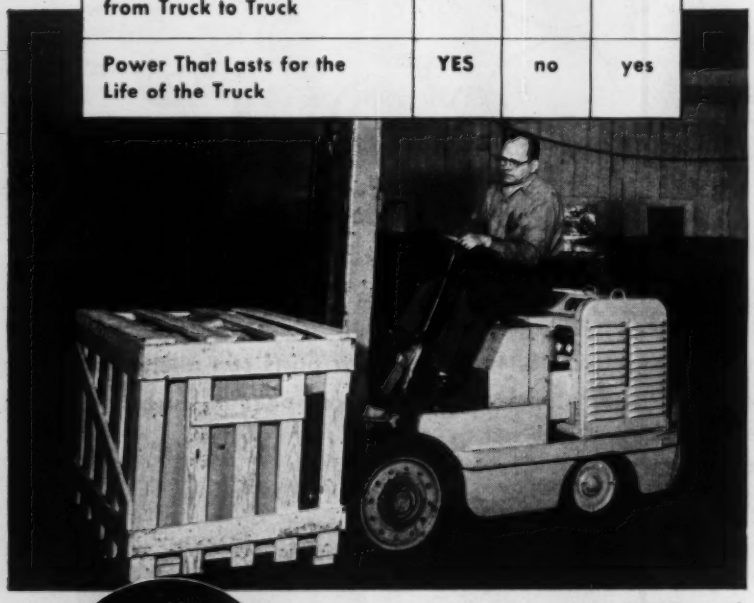
Name_____

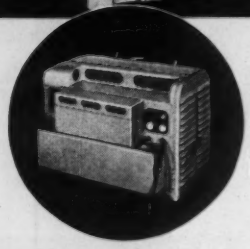
Title_____

Attach to your company letterhead and mail

READY-POWER Gives Materials Handling Trucks ALL 5 ADVANTAGES

	READY-POWER UNITS	POWER TYPE A	POWER TYPE B
Simplicity of Electric Drive	YES	yes	no
Maximum Power for Unlimited Periods	YES	no	yes
Off-the-Truck Power Unit Maintenance and Adjustment	YES	yes	no
Power That's Interchangeable from Truck to Truck	YES	yes	no
Power That Lasts for the Life of the Truck	YES	no	yes





Remember, Your Truck is No Better Than its Power

Don't let low "first costs" hide important truck operating advantages. The Ready-Power features, shown above, add up to lowest ton-mile costs, minimum downtime, fleet flexibility, and *profitable* long-range investment.

Only Ready-Power offers removable gas-electric, LPG-electric and diesel-electric power units for all makes and sizes of electric trucks . . . from walkies to 80,000 lb. giants.

Your present electric trucks can be converted to Ready-Power, and you can order new trucks "Ready-Power-equipped". Write for more information.

READY-POWER

The READY-POWER Co., 3824 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

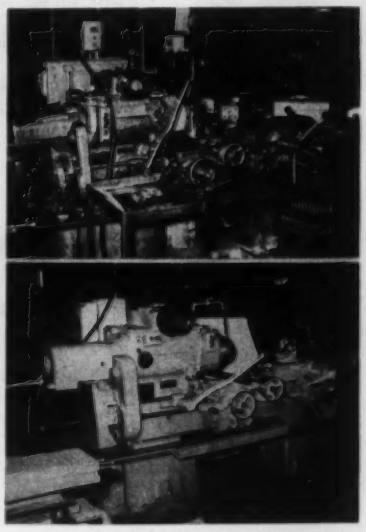
Color Dynamics

Next time you paint, consider the advantages of specific colors for machinery

PAINTING your machinery with the correct color combinations will reduce eye fatigue, improve production, reduce injuries and increase the workers' morale. Walter Kidde & Co. Inc., Belleville, N. J., says colors also are an incentive to good housekeeping.

Schemes—Green should be used for the body or main color. Only the working and moving parts stand out.

Ivory provides good light reflection (74 per cent). Applied to beds, splash pans and shields, it improves the visibility of ferrous or nonferrous work.



COLORS

. . . improve quality, reduce fatigue

Dangerous cutting edges, crushers, on-off switches, guards and electrical equipment are painted a bright orange. This increases the visibility of dangerous parts and emphasizes what they are.

Comparison—The difference between the old, dark gray paint scheme and the bright, color dynamics is immediately evident. The reflective value of the dark gray paint is about 5 per cent. Controls are hardly visible 10 ft away.

SALT BATH HEAT TREATING

Reduces Distortion

TO AN ABSOLUTE MINIMUM

REDUCES FINISH GRINDING

. . . because work is easily fixtured for best results and is not rehandled. All sections are heated uniformly by conduction. A film of frozen salt provides an "automatic preheat." Buoyancy of the molten salt also minimizes warping.

ELIMINATES SURFACE DEFECTS

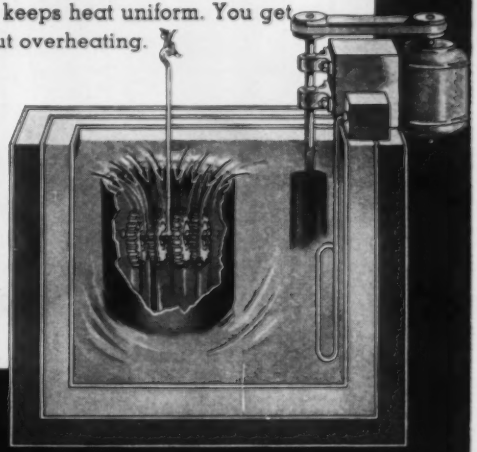
. . . because air is "sealed out." The film of molten salt surrounds the parts and protects them up to the instant of quenching.

ASSURES UNIFORM HEATING

. . . because Ajax electrodynamic stirring action keeps heat uniform. You get accurate and readily reproducible results without overheating.

GRINDING TIME CUT 80%

Martempered in Ajax salt bath furnaces and drawn to Rc62-63, these SAE-52100 bearing races show an average out-of-round distortion of only 0.002—0.003" in heat treating. Finish grinding time was reduced from 50 minutes to less than 10 minutes per race.



Cataract Quench Furnace designed for austempering and martempering.

AJAX

HULTGREN

25th YEAR

electric SALT BATH furnaces

Cost-savers for
...practically any heat treatment
...practically any alloy

ASSOCIATE COMPANIES:
Ajax Electrothermic Corp., Trenton, N. J.
High frequency induction furnaces
Ajax Electric Furnace Corp., Phila., Pa. / Low frequency
Ajax Engineering Corp., Trenton, N. J. / induction furnaces

MAIL COUPON FOR CASE HISTORY BULLETINS

AJAX ELECTRIC COMPANY,
952 Frankford Ave. Philadelphia 23, Pa.

Send actual Case History Data on applications checked:

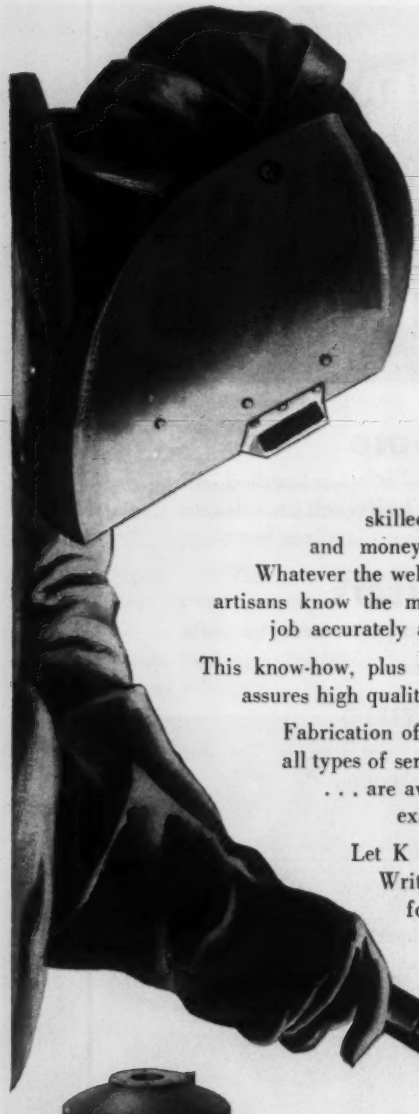
- ☐ Austempering—Martempering
- ☐ Annealing
- ☐ Brazing
- ☐ Carburizing, Cyaniding
- ☐ Hardening
- ☐ Cleaning, Descaling, etc.
- ☐ Other_____

☐ Check here for free HEATING TIME CALCULATOR for salt baths.

Name_____ Position_____

Firm_____

Address_____



weldments as you want them...

For half a century, Kirk & Blum skilled craftsmen have been saving time and money for outstanding manufacturers. Whatever the weldment required, these experienced artisans know the most efficient technique to do the job accurately and quickly.

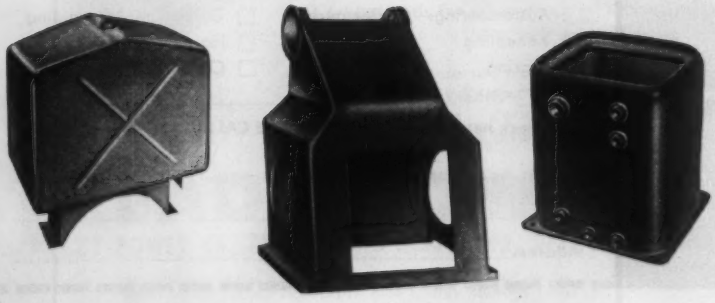
This know-how, plus modern Kirk & Blum equipment, assures high quality sheet steel and alloy fabrication.

Fabrication of guards, tanks, machine bases . . . all types of semi-finished and finished weldments . . . are available from Kirk & Blum to your exact needs.

Let K & B bring your drawings to life. Write for booklet, or send your prints for prompt quotation.

THE KIRK & BLUM MFG. CO.
3226 Forrer Street
Cincinnati 9, Ohio

KIRK & BLUM



Tin Plate Handling

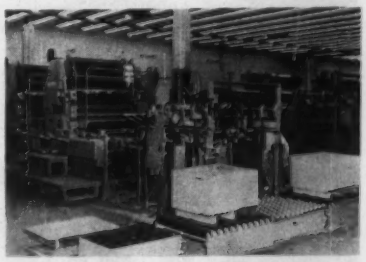
A lithography plant solved the problems of manipulating heavy loads at processing machines

CROWN CORK & Seal Co. Inc. has made tin plate handling an almost effortless operation at its Philadelphia lithography plant.

Tin plate is in constant readiness for the high-speed Dexter feeders which deliver sheets to the coaters and lithography presses where designs are applied that later enhance many canned products.

No Long Conveyors—As shown in the photo, stand-by bundles are kept in readiness on conveyor sections which flank a ball-transfer loading station. This arrangement avoids extending a lengthy conveyor section into the general plant area.

To move skid loads onto the ball-transfer table and then at right angles to the conveyor-platform of the feeder's elevator, a flat-surface skid support had to be provided. Each skid is deposited on a metal sheet which enables the load to be moved freely and smoothly onto the ball table and then to the feeder platform.



STAND-BY BUNDLES
. . . kept in readiness at feeders

Continuous Operation—Another innovation is the insertion of vertical strips between storage-conveyor rollers to provide leverage for iron bars which workmen use to nudge the 4200-lb loads forward.

As soon as one bundle is delivered to the feeder, it is replaced with another, assuring an ample supply at all times. The feeder is designed so new bundles may be loaded before the old bundle is depleted, maintaining continuous operation as long as stand-by tin plate is available.

These huge tank sections are
protected against acid attack by
U. S. Permobond. Their shipment from
maker to "U. S." plant to customer
was handled by "U. S."

The expansion plans of a chemical plant called for the design of a processing tank that was so huge it could not be shipped in one piece.

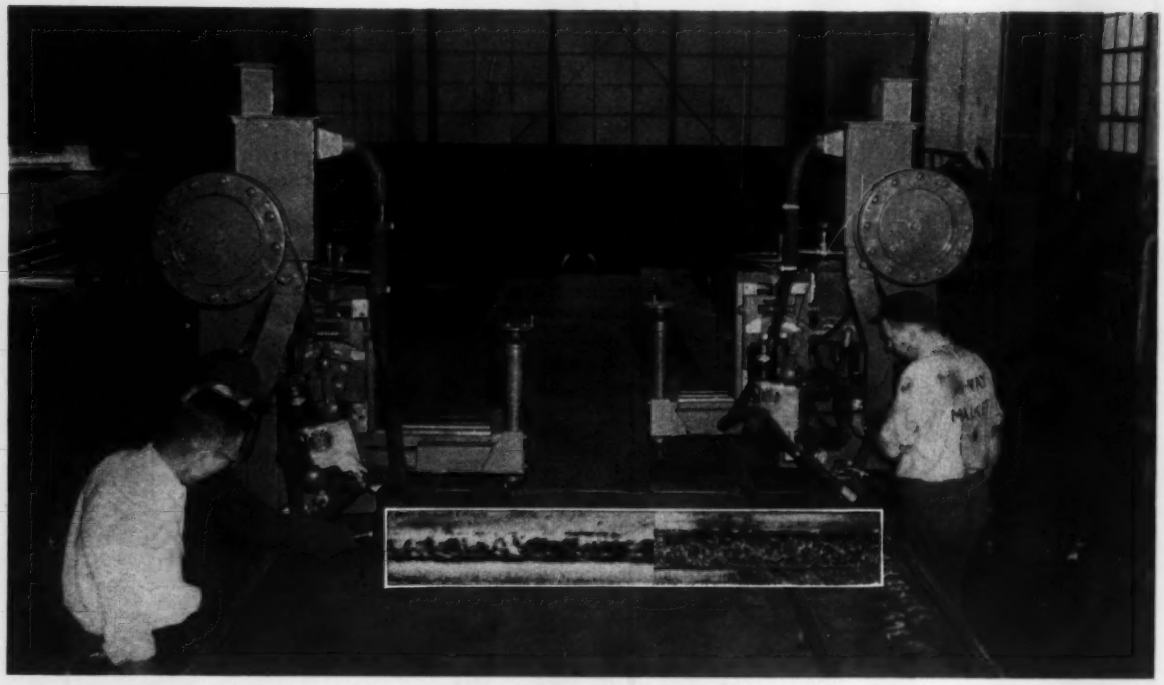
So the steel fabricator's engineers, working with "U. S." engineers, designed the tank in 2 parts. The tricky task of transporting these immense sections from the fabricator to the "U. S." plant (where U. S. Permobond protective linings were installed) and from there to the chemical plant was *arranged* by "U. S." traffic specialists. When the 2 sections arrived at the chemical plant, "U. S." field service men vulcanized the joints after the halves were welded together, making a complete rubber lining with no seams or joints. Thanks to the Permobond® lining, the tank is immune to acid attack.

For protection against corrosion of tanks, piping, valves—get in touch with us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber



Automatics at work on web girder. Submerged arc welds 216 in. per minute with only one operator. Inset shows the excellent weld quality under the fused flux

Make-Your-Own Automatic Welder

When you can't find exactly the equipment you need for automation, your own shop may be the answer. Here's what can be done

"HOW CAN WE use automatic welding fixtures when they're so big and complex?" asked Alliance Machine Co. Hand welding of its girders was expensive, smoky, inconvenient and involved cleanup time.

Needed was a portable, automatic welding machine, designed for flexibility—one that would allow the work to remain stationary until welding was complete.

Alliance design engineers had the answer. The shop made a girder welding machine that uses a submerged arc. It can be carried on a platform from one job to the next. Labor costs have been reduced 50 per cent, welding time 70 per cent. Other savings, such as weld cleaning time and the stub end loss of hand electrodes, aren't included.

Standard Equipment — Welded girders are today's standard for overhead traveling cranes as well as a variety of steelmaking equipment. Weldments of this size seemed a natural for a carriage-mounted, automatic welder that could be used on any box-type, or single-web girder.

Designers came up with a motor-driven fixture that uses a standard, Lincoln Electric welder. Controls are mounted within easy reach of the operator and are intercoupled to regulate speed, electrode feed

This completed box-type girder for an overhead crane required five freight cars to move it to its destina-

and flux deposition. Only one operator is needed.

A wire reel flux hopper and flux recovery unit have been added. Flux is placed automatically ahead of the arc through a flexible hose attached to the hopper valve. Unfused flux is picked up behind the arc by a vacuum cleaner and put into a flux recovery unit.

No Lifting—Fixtures are carried from one job to the other by a small, hydraulically operated, elevator table that resembles a die-transfer dolly. The fixture is rolled over to the beginning of the weld, the table is adjusted to the correct height and the welder started. After the weld is completed, the transfer table is rolled to the opposite end, and the welder rolls off the work onto the table for transportation to the next job.

Two machines are in use, one for the top cover to web connection and the other for the bottom cover to web. The two welds are made simultaneously with the girder on its side—one pass is all that is required.

Power for each machine is supplied by a 900-amp, motor-driven welder. Weld speed is 216 in. per minute.

All welds are checked with Magnaflux. Quality has been improved.

tion. The extremely long, continuous welds are best made by automatic welders

Storing of cartons on gravity-feed racks achieves . . .

Speed-Up in Order Filling

GRAVITY-FEED racks help Holo-Krome Screw Corp., Hartford, Conn., ship catalog items from stock the same day the order is received. The firm produces all types of cold-forged socket screws, and 1500 standard items within those types.

Gearing to a "one-shipment, one-invoice, same-day" pledge puts the burden on the shipping department. Tons of steel and finished product are received and disbursed by truck each day in the firm's one-story, receiving-shipping-steel storage addition (it was completed last summer).

Before — Conventional steel shelving was used more than a year after the same-day distribution policy went into effect, before the new addition was ready.

It was a bottleneck. Order-picking took too much time. Too many footsteps were necessary to cover the number of fronts, which varied from day to day, and stock rotation was by hand. The racks sprawled over space much too valuable to squander.

New — Nine bays (each 60 ft long) of gravity-feed racks were assembled in two continuous sections in the new shipping addition last July by Artco Corp., Flourtown, Pa.

Gravity now does the work. The cases of prepacked hex-socket screws are stored on an incline. When the order selector removes the case he wants from the front rack, cases behind slide down into front position, ready for picking.

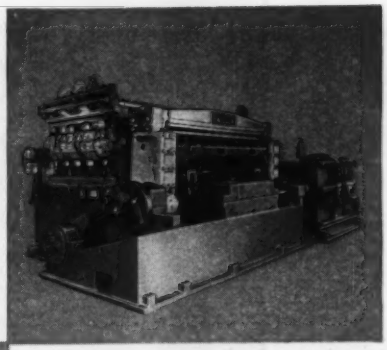
No Traffic Jams—All feeding is done from the rear; picking is from the front. This steps up traffic because feeding and picking aisles function independently without jams and interruptions.

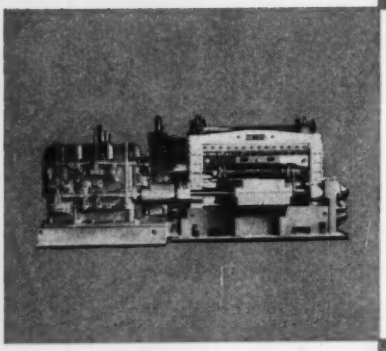
The racks cut 50 per cent off the aisle space required per front. The total installation has 1085 fronts, each 60-ft bay holding about 540 items.

Speed-Up—The selector can get what he wants without walking so far. There are no cases to be moved out of the way. The inclined runners make it easy to see and identify case contents. Order labels are preprinted with the name of the distributor, eliminating the old stencil-and-brush method.

The selection system guarantees automatic stock rotation, important for the manufacturer who wants constant inventory turnover.

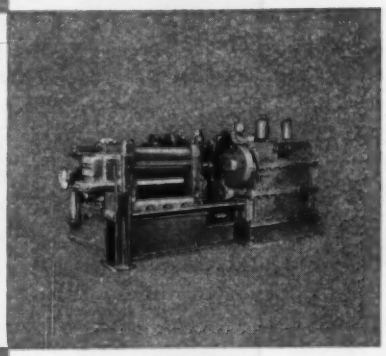
flexible design

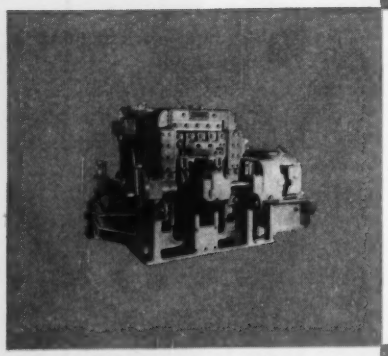




cutting accuracy

continuous feed





rugged construction

Automatic Shears

by HALLDEN

"the shearing specialists"
THE HALLDEN MACHINE CO.
THOMASTON, CONNECTICUT

Sales Representatives
The Wean Engineering Co., Inc., Warren, Ohio (Ferrous)
T. E. Dodds, Pittsburgh, Pa. (Non-Ferrous)
W. H. A. Robertson & Co., Ltd., Bedford, England (Ferrous & Non-Ferrous)

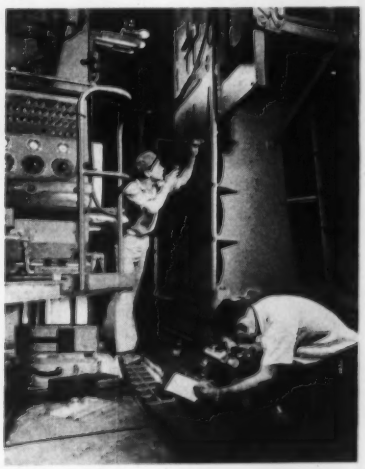
Microconstruction

Here is an instrument that's better than a transit. Checks within 0.001-in.

MACHINERY erection accurate to the thousandth of an inch is a must in modern factories. Careless, erector-set construction is out.

Transits and similar optical equipment have been stand-bys in the placement and adjustment of precision machinery. In Alcoa's huge Cleveland plant, F. H. McGraw & Co., New York, replaced them with micro-optical instruments to install a Pratt & Whitney die-cutting machine.

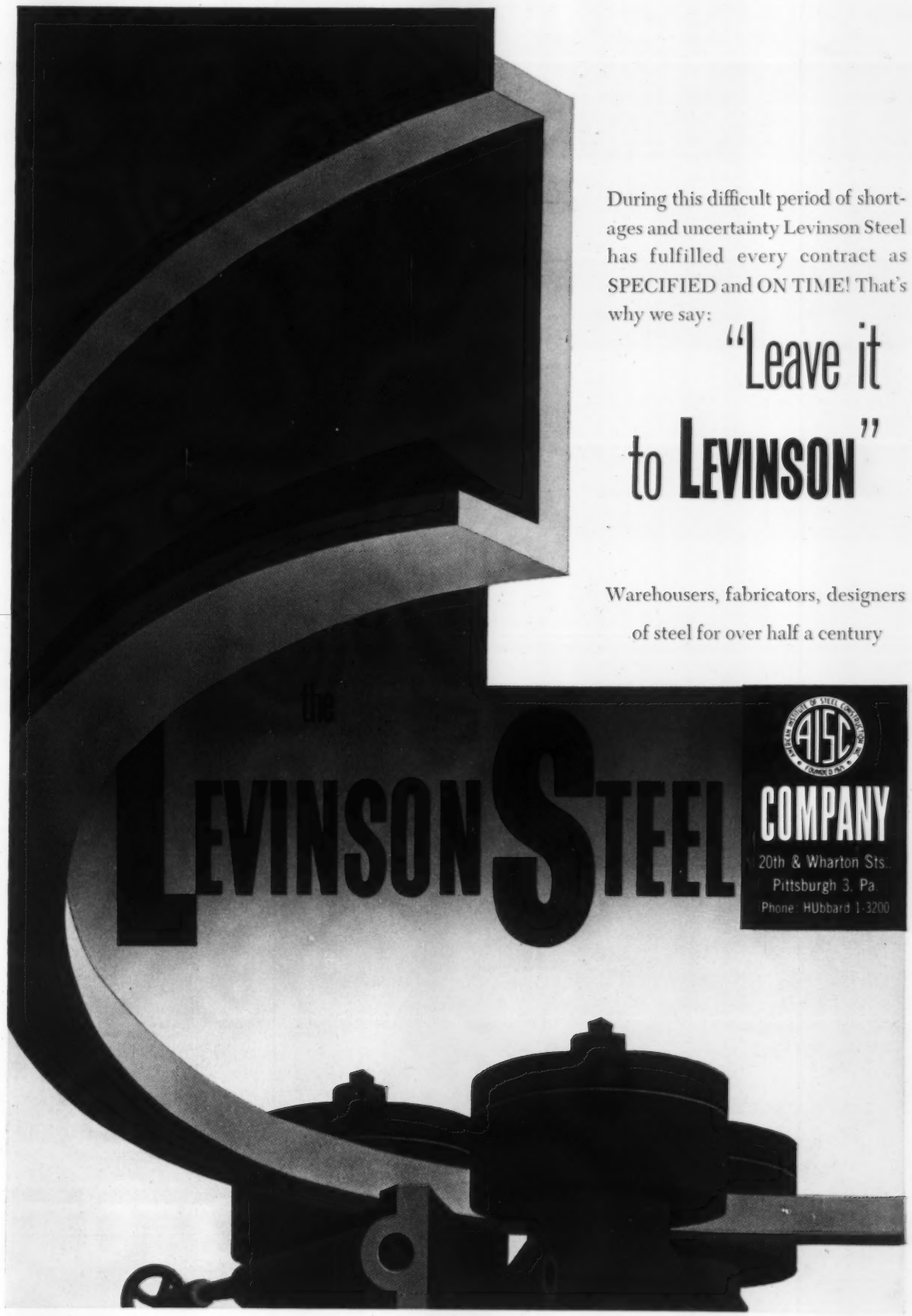
Aligning—One of the precision optical instruments used is called a micro-alignment telescope with auto-collimator. It is made in England by Taylor-Hobson. It aligns the table and ways on huge machinery to less than 0.001-in. The vertical and horizontal relationships are checked through a prism and a height gage.



CAREFUL
. . . micro-alignment scope and auto-collimator

After erection and testing, the die-cutting machinery will make dies used in 35,000 and 50,000-ton aluminum forging presses. Final products: A variety of airplane sections for the Air Force.

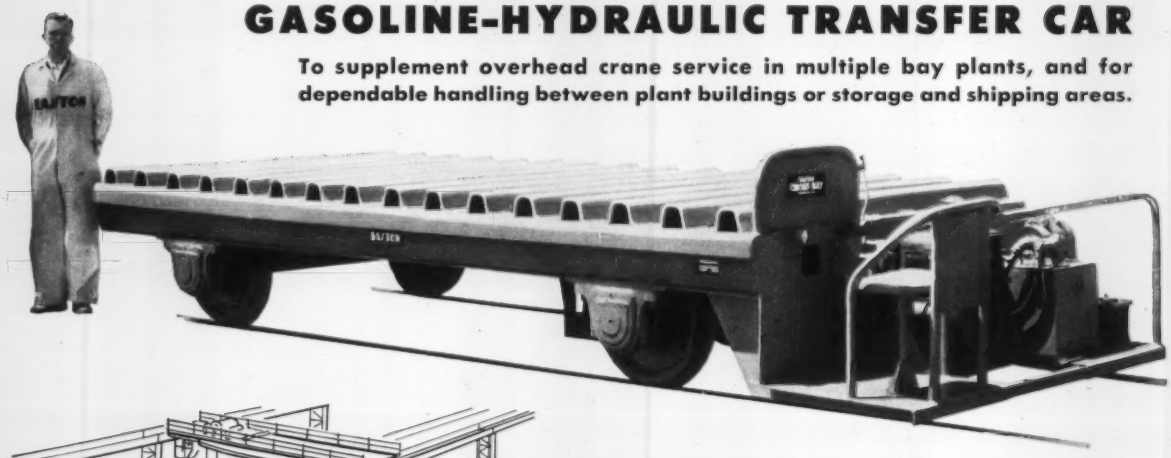
Precise accuracy in die cutting eliminates the costly machining of forged airplane sections. Properly installed, the die cutting machinery with electric controls can inscribe a person's signature or engrave a delicate profile.

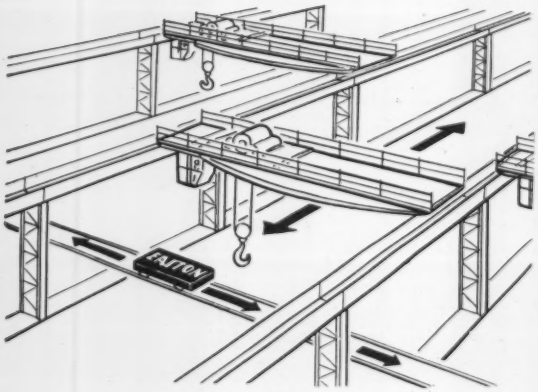

During this difficult period of shortages and uncertainty Levinson Steel has fulfilled every contract as SPECIFIED and ON TIME! That's why we say:
"Leave it to LEVINSON"
Warehousers, fabricators, designers of steel for over half a century
the
LEVINSON STEEL
COMPANY
20th & Wharton Sts.
Pittsburgh 3, Pa.
Phone: HUbbard 1-3200

NEW CROSS-BAY®

GASOLINE-HYDRAULIC TRANSFER CAR

To supplement overhead crane service in multiple bay plants, and for dependable handling between plant buildings or storage and shipping areas.

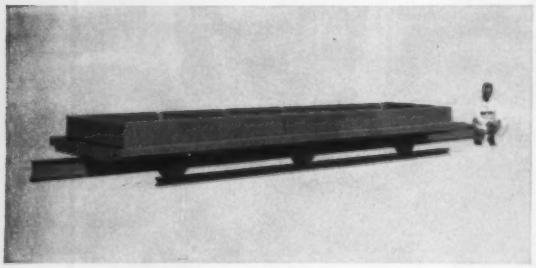




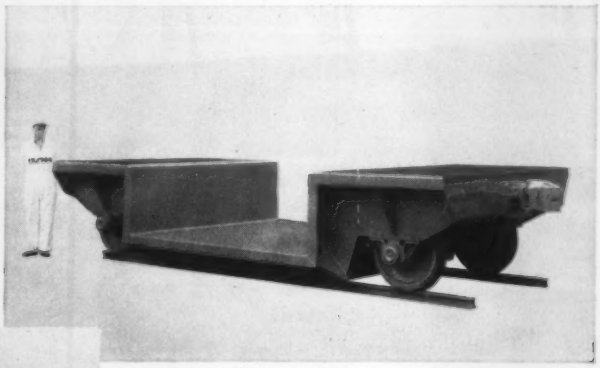
EASTON CROSS-BAY CARS are custom-built to meet speed and capacity requirements. Special superstructures can be designed for specialized or mechanized handling. The gasoline-hydraulic Cross-Bay Car illustrated above was built for steel warehouse work. It provides a capacity of 25 tons plus 50% for impact loading, and a two-way speed of 50 feet per minute.

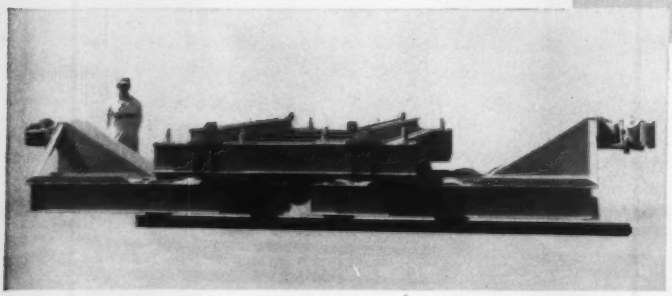
In addition to the gasoline-hydraulic car shown above Easton Cross-Bay Cars may be powered by electric motor, electro-fluid drive, gasoline-electric drive or storage battery. Capacities from 5 to 500 tons. Controls may be manual, electric (by push-button on the car or remote station) or electronic.

SEE EASTON FIRST FOR CUSTOM-BUILT CARS FOR INDUSTRY



Annealing Furnace Car Equipped with Rack Beam ▲





▲ Split-level Platform Car—Capacity 50 tons

◀ Double-truck Transformer Transfer Car —Capacity 150 tons

A-1049

EASTON®

EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.

Short-Cut Switcher

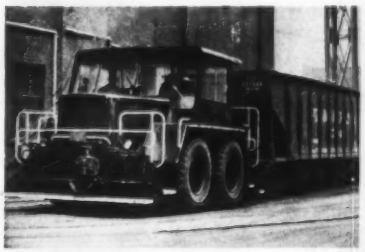
Taking the shortest route between assignments, it travels over rails, streets or fields

A RUBBER-TIRED switch engine that climbs over tracks, travels on city streets and has the pull of a conventional 50-ton locomotive may fill one of industry's biggest needs.

Although custom built for the Pennsylvania Railroad, the switcher, known as the SwitchMobile, is scheduled to become a standard production machine soon.

Built by LeTourneau - Westinghouse Co., subsidiary of Westinghouse Air Brake Co., it will handle switching operations in congested areas. It will speed movement of cars, both loaded and empty, to industrial plants and shippers' docks because its movement is not restricted to rails.

Specifications—The unit weighs less than 18 tons, is 10 ft 3 in. wide and 10 ft 8½-in. high. Length from coupler to coupler is slightly longer than a standard passenger automobile.



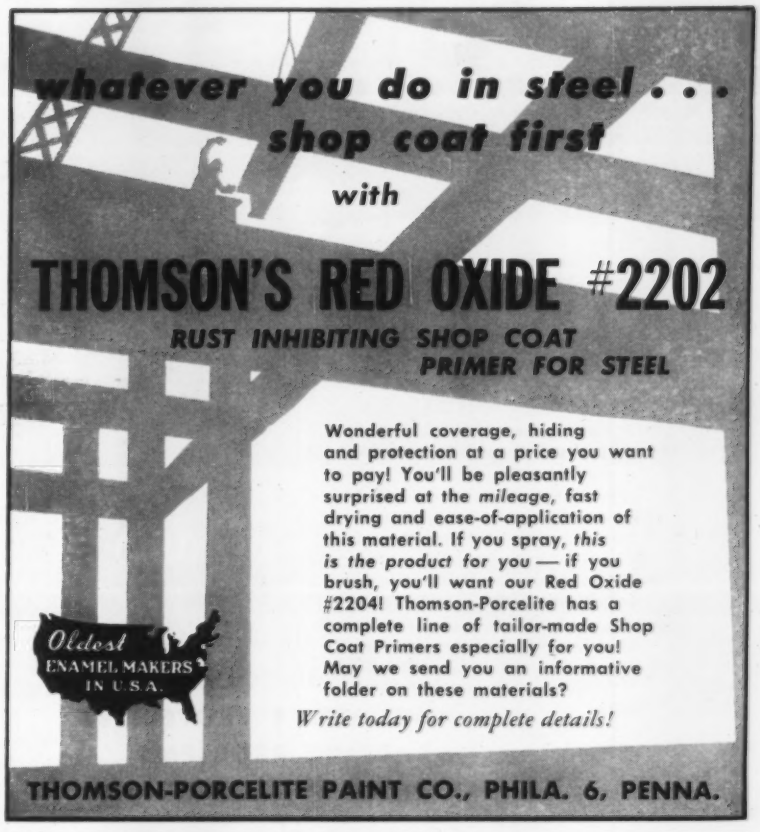
SWITCHMOBILE
. . . has pull of 50-ton locomotive

Equipped with a General Motors, 208-hp diesel engine, the all-wheel drive machine develops about 30,000 ft-lb of rimpull or tractive effort—enough to push or pull a gross weight of more than 1000 tons from a standing start. In tests the switcher has pulled as many as eight loaded freight cars.

Appearance—In appearance, the machine is "railroad." Hand rails, steps, foot boards, couplers and air hoses are identical to those found on conventional locomotives. Even the lines of the cab carry on this impression.

Because it runs on big 18:00 x

(*Please turn to page* 126)


whatever you do in steel . . .
shop coat first
with
THOMSON'S RED OXIDE #2202
RUST INHIBITING SHOP COAT
PRIMER FOR STEEL
Wonderful coverage, hiding and protection at a price you want to pay! You'll be pleasantly surprised at the mileage, fast drying and ease-of-application of this material. If you spray, this is the product for you — if you brush, you'll want our Red Oxide #2204! Thomson-Porcelite has a complete line of tailor-made Shop Coat Primers especially for you! May we send you an informative folder on these materials?
Write today for complete details!
Oldest ENAMEL MAKERS IN U.S.A.
THOMSON-PORCELITE PAINT CO., PHILA. 6, PENNA.

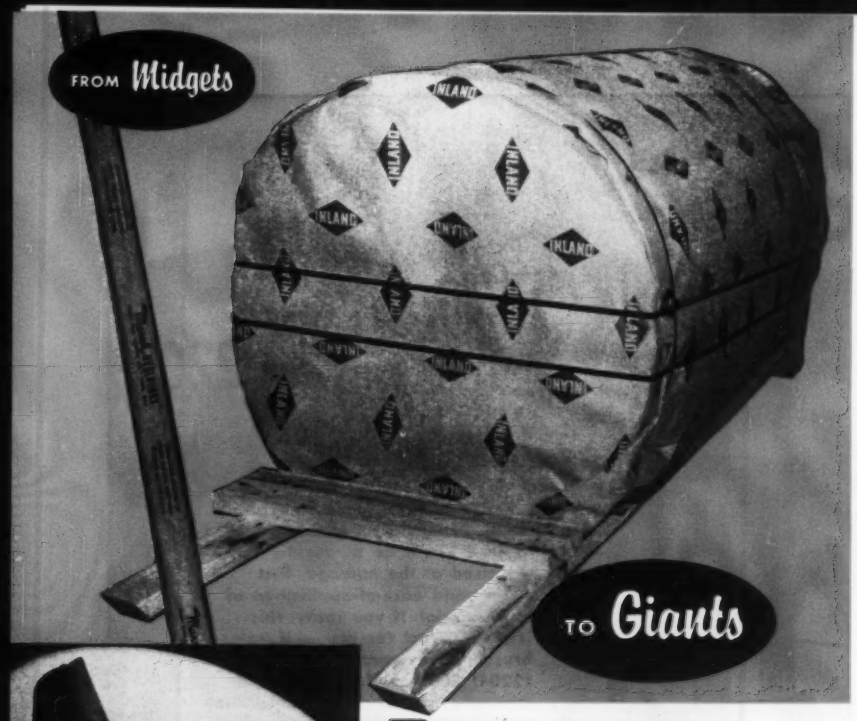
CONTROL and COMMUNICATION

Femco engineered remote control and voice communication systems are designed for many different applications. Get the facts. Submit your problem for a proposal.

REMOTE CONTROLS
Operate cranes, remove pit covers, monitor motors, send warning signals, etc.

TROLLEYPHONES
Voice communication between crane cabs and floor, mine locomotives and dispatcher.

AUDIOPHONES
Wired voice systems installed anywhere in industry. Common talking or selective.



THILCO IS SOLVING MORE METAL PROTECTIVE WRAPPING PROBLEMS ...THAN EVER BEFORE!

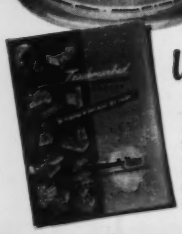
Wrapping steel and non-ferrous metals of any size is no problem to Thilco. We can furnish protective papers as narrow as you want for spiral wrappings of small products and parts—or as wide as 10 ft. for skid wraps and covers and in giant "blanket" sizes for shrouds and tarpaulins.

FUNCTIONAL PURPOSE NO PROBLEM — Thilco papers are made in any number of grades for waterproof protection, prevention of moisture-vapor transmission and grease and oil penetration. Thilco also produces an endless variety of special treatments and paper combinations to meet any functional purpose. And, Thilco can make any grade just about as tough and durable as your demands call for.

GET TO KNOW THILCO — Chances are 100 to 1 we can help solve your *protective* wrapping problem. We'll be glad to have a representative tell you more, at your request — Or, write and tell us your problem. No obligation, of course.

PRODUCT Identity, too

All Thilco papers can be furnished trade-mark *Print Decorated* to add selling punch to your protective wrappings for very little extra cost. In fact, it's the cheapest advertising you can buy.



Write for free sample Kit of PRINT DECORATED Thilco Functional Protective Papers — and Case Histories Today.

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Functional Papers FOR PROTECTION THAT COUNTS!

NEW YORK • CHICAGO
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THILMANY PULP & PAPER COMPANY
KAUKAUNA • WISCONSIN

(*Concluded from page 125*)

25 rubber tires, it can travel across tracks without damage to signal equipment, switches, ties or rails. A wheel gage of 8 ft 4½-in. allows it to straddle rails and run on ties as well as operating on pavement flush with rail tops when pushing or pulling cars.

Never Backs Up — A machine that never has to back up, the SwitchMobile travels, pulls or pushes with equal power and speed in either direction. It is equipped with a special four-speed transmission which has the same gear ratios in both directions. A separate lever, independent of the gear change, allows quick shifting from forward to reverse.

A torque converter combined with transmission provides smooth starts. Speeds: First gear, 1.3 mph; second gear, 3.1 mph; third gear, 7 mph; fourth gear, 16 mph.

Standard Operation — Coupling cars to the SwitchMobile is standard railroad procedure; the unit is fitted with regulation AAR Standard Type E couplers and air brake lines in front and rear. To provide additional flexibility in coupling and hauling cars, the couplers are mounted on sliding tracks to allow the coupler and air hose to be centered or swung right or left.

This feature serves two principal functions: It allows the machine to haul cars around track curves as sharp as 50 ft in radius and permits maximum use of the unit's maneuverability in close quarters. When working close to a fence, near power poles or along the sides of buildings, additional clearance can be gained by favoring the close side and sliding the coupler to line up with the car connection.

Big rubber tires permit the switch engine to travel across tracks without damage to signal equipment, switches, ties or rails. It travels with the same ease on streets, roads or even across open fields

Straddle Carrier Handles 30,000-lb Load

The series 93 straddle carrier features a five-speed syncromesh transmission and 15-per-cent-more horsepower at the wheels than previous models.

It is designed for rugged steel mill service. All welded steel construction combines high strength and low weight.

All power train components, including clutch, differential, transmission and chain drive, are designed for high stress operation.

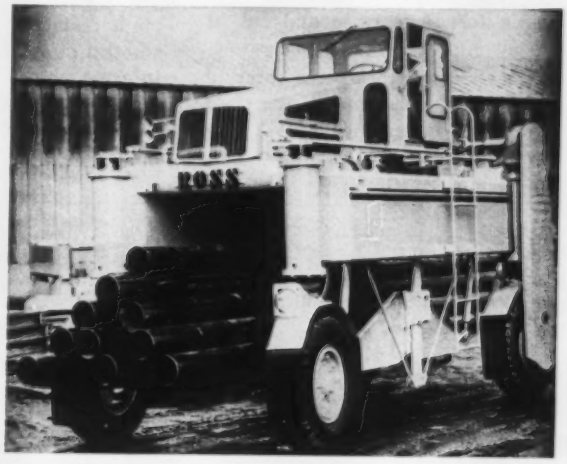
Four-wheel steering gives an inside turning radius of 9 ft 7 in. Power steering is optional.

A double-acting hydraulic cylinder actuates a simple lever and link hoisting mechanism. Hoist speed is 32 fpm at 2000 rpm..

The 9-ft-long load hooks have machined rollers to prevent cramping and excessive pressures on the center guide.

Tubular crossmembers in the frame are used as fuel and hydraulic tanks, increasing the operator's visibility.

Purchasers may choose the standard Hercules 131-hp engine, or an optional Hercules 142-hp engine. With the standard engine, road speed is 38.2 mph.



There are nine models capable of carrying loads from 54 to 66 in. high and 52 to 64 in. wide. *Write*: Ross Carrier Division, Clark Equipment Co., Benton Harbor, Mich. *Phone*: Walnut 6-6184

Vertical Chucker Has Eight Spindles

The hydraulic chucking automatic has 14-in. capacity chucks, eight turning slides and four cross slides.

Four "auto cross slides" can be operated on the vertical turret at one time, to give greater tooling adaptability for production machining of large forged and cast pieces.

Cross slides complement the vertical end-working slides and provide flexibility and additional tooling operations.

Because the independent cross slides are mounted on the lower frame and actuated by cam drums located beneath them, they provide maximum support for the heaviest forming cuts, as well as crossfacing or necking operations.

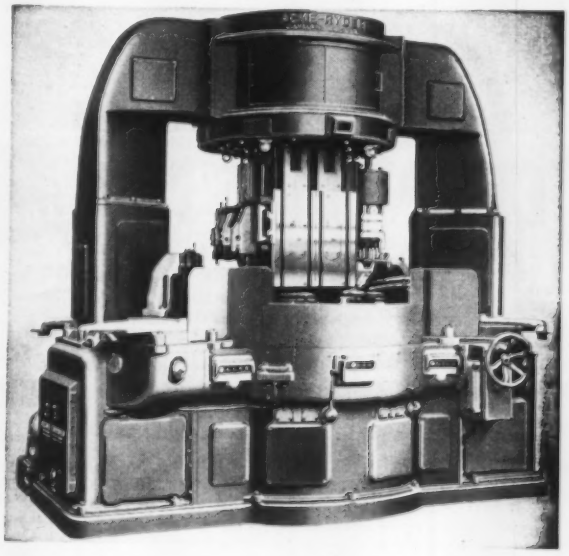
Turning slides travel 9 in., facing slides, 5¼-in.

The machine's power (it has a 60-hp main motor) will accommodate future tooling improvements.

Standard spindle speed range is 32 to 628 rpm. Three speeds are obtainable on each spindle with each set of change gears. There are 26 sets of change gears which provide 52 ranges of three spindle speeds each.

A 7½-hp motor indexes the spindle carrier.

Machine controls are near the loading station and are duplicated at the rear for ease in setting up.



Arch-type construction with heavy columns is used in the frame to insure rigidity and permanent tool-slide alignment. *Write*: National Acme Co., 170 E. 131st St., Cleveland 8, O. *Phone*: Glenville 1-9080

NEW PRODUCTS and equipment

Gear Shaver

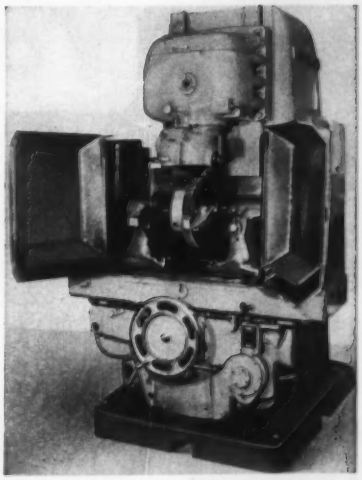
Model GCP finishes external and internal spur gears with up to 24-in. pitch diameter. Loading rails ease external gears in and out of the machine.

A swivel workhead and internal cutter head attachments are used in shaving internal gears. A hollow spindle in the workhead permits the shaving of parts with integral shafts.

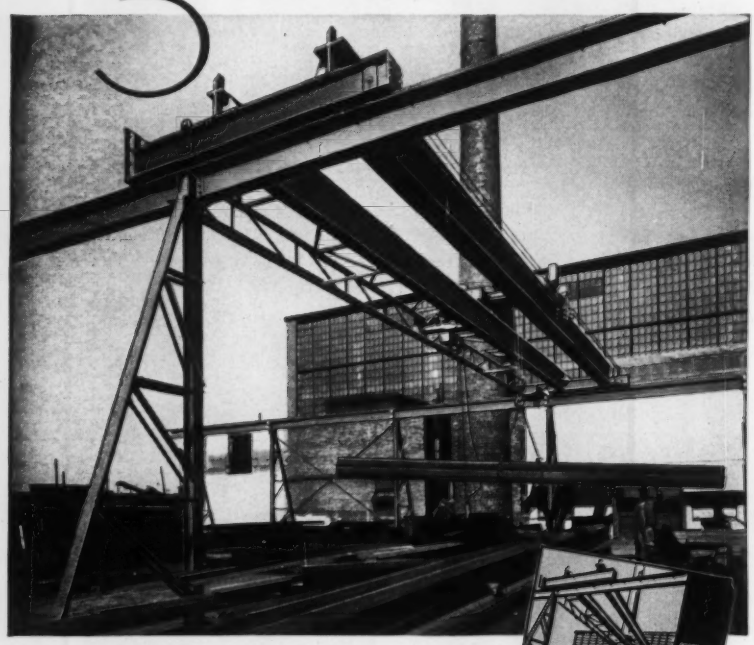
The work gear drives the cutter when shaving internal gears. When shaving external gears, the cutter drives the work on the machine.

External gears from 3 to 24 in. pitch diameter in the 2 to 16 diametral pitch range can be shaved. Internal gears from 6 to 24 in. pitch diameter in the same tooth size range are shaved.

In straight shaving, the maximum table stroke is 10 in. A 6-in. stroke is possible in crown shaving. *Write*: National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. *Phone*: Walnut 1-8980



3 reasons why...



CRANEMASTER is your top value!

- *You save on engineering cost* because there's a *standardized* CRANEMASTER for virtually every building condition.
- *You save on production cost* because time and material savings of modern manufacturing techniques are passed along to you.
- *You gain long term efficiency*, because CRANEMASTER is soundly designed and carefully built for maximum performance, minimum maintenance.

CAPACITIES to 15 TONS—SPANS to 60 FT.

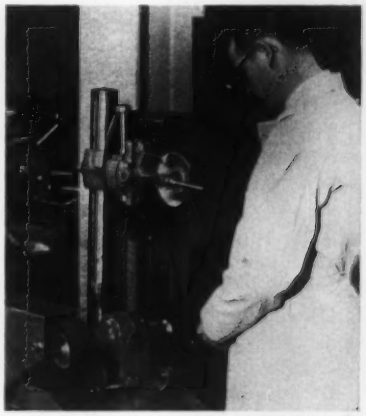
send for BULLETIN C-110

Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling Cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

ABELL-HOWE COMPANY 7747 Van Buren Street • Forest Park, Illinois

Belt Grinder

Rubber contact wheels give a better finish in less time when using the new 2½-in. belt grinder. Costs are less because the life of abrasive belts is increased.



Lateral adjustment of the drum gives easy and accurate belt alignment. *Write*: Delta Power Tool Division, Rockwell Mfg. Co., 446 N. Lexington Ave., Pittsburgh 8, Pa. *Phone*: Churchill 1-8400

Adhesive

Porous and nonporous materials are bonded by an elastomeric adhesive. It can bond metal frames to veneered plywood, aluminum sheets to aluminum channels, plas-

tic laminates to metal counters and table tops.

It also can be used in sandwich construction to bond aluminum sheets to paper honeycomb.

The material has a rapid strength build-up rate, high adhesion to steel, high softening point, good sprayability and excellent resistance to plastic flow. *Write*: Adhesives & Coatings Division, Minnesota Mining & Mfg. Co., 411 Piquette Ave., Detroit 2, Mich. *Phone*: Trinity 5-7111

Cream Soap

A white, opaque, thick-bodied soap does not run off the hands. It's almost impossible to waste.

A synthetic detergent gives effective cleansing action while Lanolin provides good skin conditioning.

The deodorant soap is dispensed from a throw-away container. *Write*: Sugar Beet Products Co., 302 Waller St., Saginaw, Mich. *Phone*: 2-6197

Insulation Block

F-20 Fiberfrax blocks withstand flame impingement and temperatures up to 2300° F. They are unaffected by furnace atmospheres.

The ceramic fiber block has a density of about 20 lb per cu ft. The block's low thermal capacity reduces heat capacity, making furnace equipment more responsive.

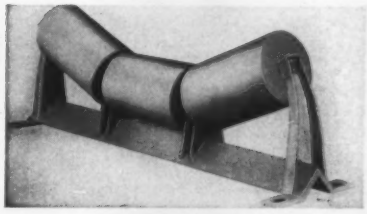
Linear shrinkage of the blocks after a 12-hour soak at 1500°F is 0.21 per cent; after 24 hours at 2300°F, shrinkage is 3 per cent. *Write*: Carborundum Co., Niagara Falls, N. Y. *Phone*: 6631

Conveyor Idler

A ball-bearing idler is made of a smooth, uniformly thick outer shell plus a heavy-wall steel center tube. Brazed to dish-shaped steel heads, the tubes form to a strong, moisture-tight unit.

Slotted mounting holes permit the idler to be adjusted to compensate for support variations and allow for training of the belt.

The idlers are available in seven belt widths from 14 to 36 in. There are two lubrication systems. A



one shot system greases all three rolls at once, while a factory sealed type needs no further greasing. *Write*: Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill. *Phone*: Randolph 6-7790

NEW PRODUCTS and equipment

Coil-Lifting Magnet

The open-frame design permits steel coils to be lifted without removing the spindle on which they are wound.

Weighing 2000 lb, the unit can lift about 5 tons and handle coils up to 42 in. in diameter.

The three magnet coils are made of heavy-duty copper wire and

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features:

- **Rapid Ram Approach** — Automatically changes to power stroke when it contacts the work.
- **Movable Workhead** — Self-contained—easy to center over the work. Workhead can be purchased separately.
- **Variable Ram Speed** — From zero to maximum under fingertip control.
- **Modern Design** — All operating controls at convenient working height.

These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request. Send the coupon today.

DAKE PRESSES

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640 Seventh Street, Grand Haven, Mich.
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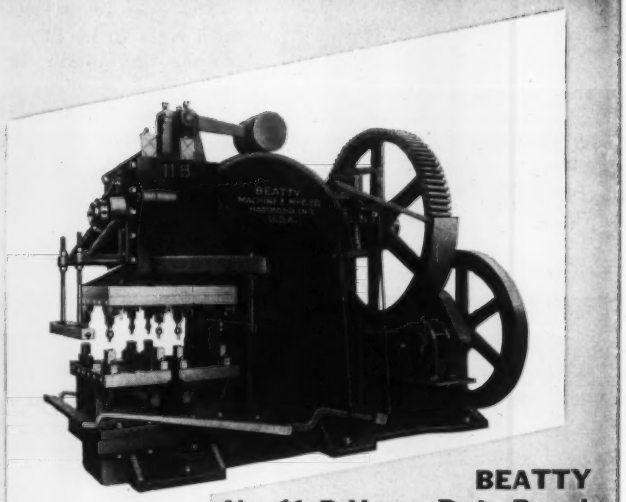
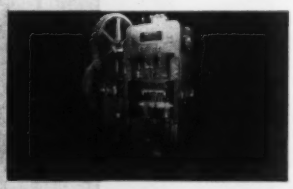
FOR FASTER
HEAVY DUTY PUNCHING

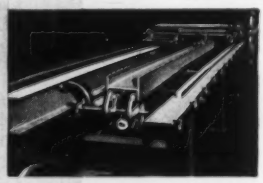


BEATTY
No. 11-B Heavy Duty Punch

HANDLES EVEN THE MOST COMPLICATED PUNCHING IN A SINGLE PASS



BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.



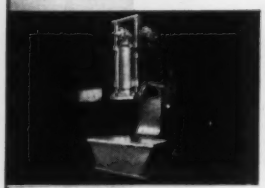
BEATTY Spacing Table handles web and flange punching without roll adjustment.

In less time, with less manpower, this BEATTY Heavy Duty Punch handles even the most complicated punching jobs . . . produces up to 34 patterns without a single tool change.

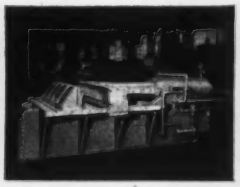
Used with the standard BEATTY Spacing Table, it accommodates steel shapes up to 65 ft. long and plates up to 42 in. wide. With exceptionally large die space, the machine can be tooled to the specific needs of the job—punches webs and flanges. Spacing of holes and slots is precise and practically automatic with the BEATTY Spacing Table.

In addition to increasing your output, this versatile unit reduces your labor costs. One operator and one helper are all the manpower required, and the machine is built for either right or left hand operation.

Consult a Beatty engineer for more information on a *job-engineered* BEATTY installation to fit your needs.



BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.

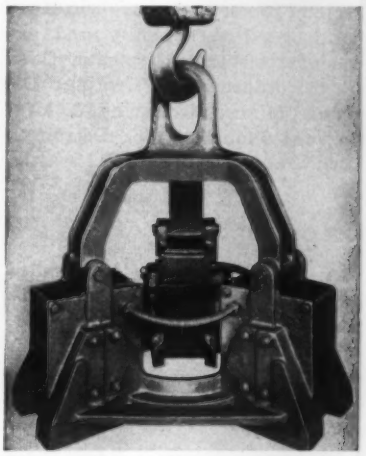


BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

BEATTY
MACHINE & MFG. CO.
HAMMOND, IND.

NEW PRODUCTS and equipment

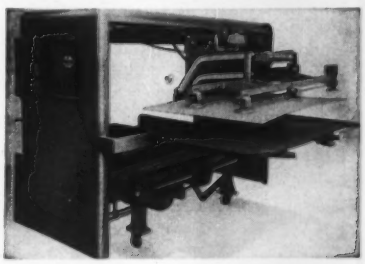
glass insulated. They provide proper ampere turns for full magnetization at all operating tem-



peratures. *Write*: Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Cleveland, O. *Phone*: Montrose 2-8484

Sheet Feeder

This unit feeds sheet from 8 x 8 in. to 48 x 144 in. to a punch press automatically. It will feed up to 30 sheets a minute. The air-operated feeder is self-contained



and can be moved. Its controls can be interlocked with those of the press. *Write*: Hamilton Automation Inc., Hamilton, O. *Phone*: 2-4581

Transfer Machine

Automatic stock cut-off is combined with double-end machining in this transfer machine. Bar stock is fed automatically to a circular sawing cut-off station.

Secondary machining heads can be equipped for centering, cham-

ANNOUNCING...

the Beryllium Copper ROLLPIN®

Strong . . . highly resistant to corrosion . . . nonmagnetic . . . extremely conductive

Now you can use Rollpin to cut assembly and maintenance costs in a whole new group of applications. A new line made of beryllium copper, one of the strongest of the copper base alloys, opens the door to a wide variety of uses where resistance to corrosive attack, good electrical properties and other unusual characteristics are required. These slotted tubular copper spring-pins can be used in assemblies that range from plumbing fixtures to electrical instruments, particularly in conjunction with other copper base alloy components.

Rollpin has already established its ability to replace taper pins, straight pins and set screws; to serve as a rivet, dowel, hinge pin, cotter pin or stop pin . . . eliminating special machining, tapping and the need for hole reaming or precision tolerances. Driven into a hole drilled to normal production standards, it locks securely in place, yet can be readily drifted out and reused whenever necessary.

Rollpin is available in beryllium copper from .062″-diameter to .250″-diameter, and in steel and stainless steel up to .500″-diameter.

ELASTIC STOP NUT (ESNA) **CORPORATION OF AMERICA**

Dept. R35-360, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

☐ Data on beryllium copper Rollpin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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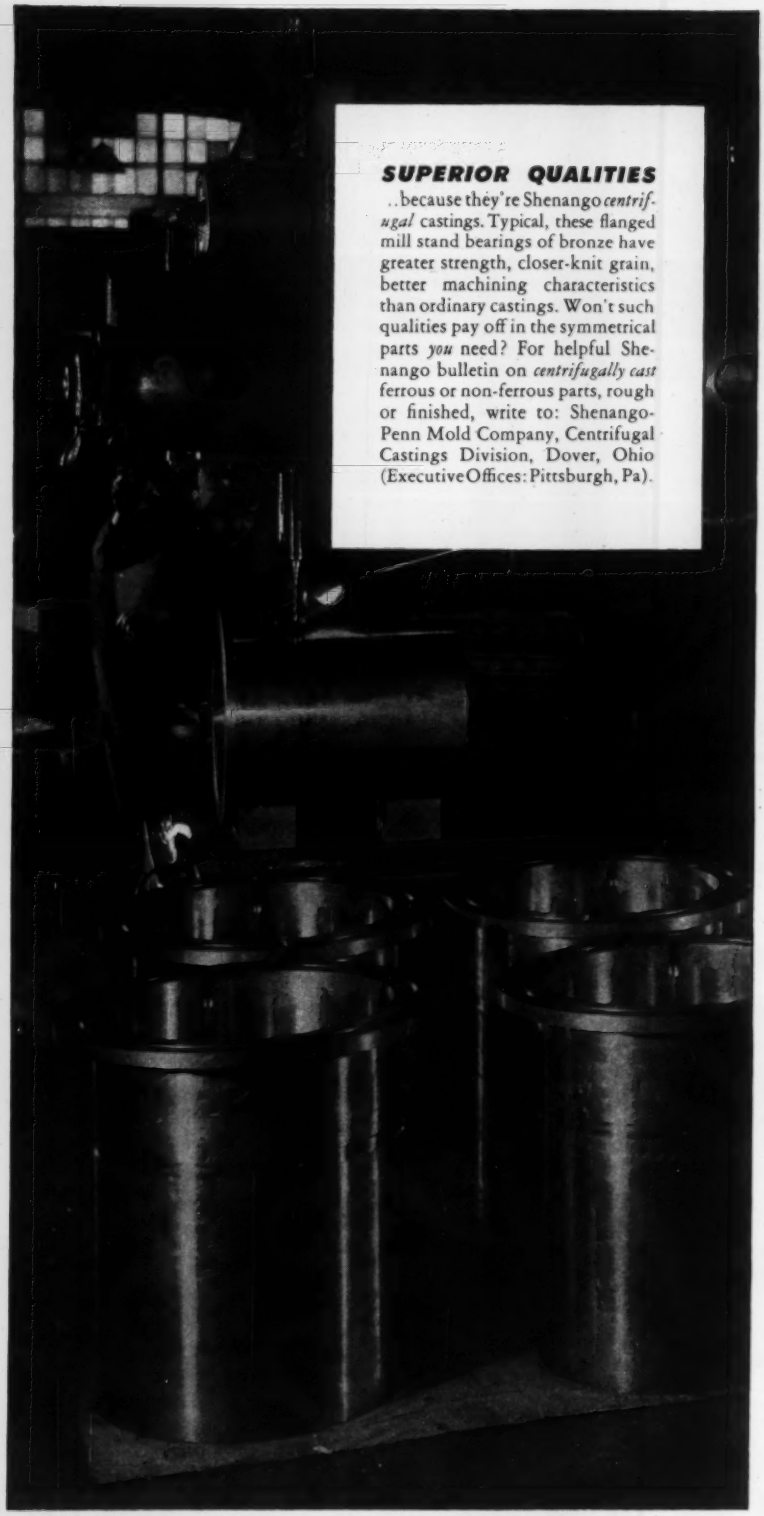
Firm_____

Street_____

City_____ Zone____ State_____


SUPERIOR QUALITIES
..because they're Shenango centrifugal castings. Typical, these flanged mill stand bearings of bronze have greater strength, closer-knit grain, better machining characteristics than ordinary castings. Won't such qualities pay off in the symmetrical parts you need? For helpful Shenango bulletin on centrifugally cast ferrous or non-ferrous parts, rough or finished, write to: Shenango-Penn Mold Company, Centrifugal Castings Division, Dover, Ohio (Executive Offices: Pittsburgh, Pa).
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COPPER, TIN, LEAD, ZINC BRONZES • MONEL METAL
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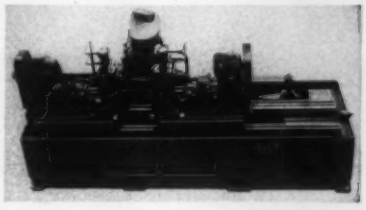
NEW PRODUCTS and equipment

fering, turning, drilling or boring. Box mill turning can be combined with center drilling and chamfering.

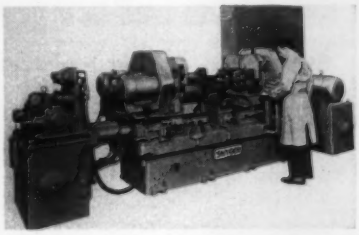


Two machine sizes have a capacity of ¼ to 1½-in. and 1 to 4-in. diam tubing or solid stock. *Write*: Machinery Mfg. Division, Motch & Merryweather Machinery Co., 888 E. 70th St., Cleveland 3, O. *Phone*: Utah 1-1515

Boring Machine

This two-way boring machine finishes a part in 50 seconds. The eight-spindle unit machines 19 different cast-iron, power take-off transmission cases.

Belt changing devices make quick spindle speed changes for various bore sizes. Magnetic chucks are used.



Each two-spindle boring head is a separate slide unit and can be set up to give maximum flexibility in small quantity production. *Write*: Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, Mich. *Phone*: Lorain 7-0123

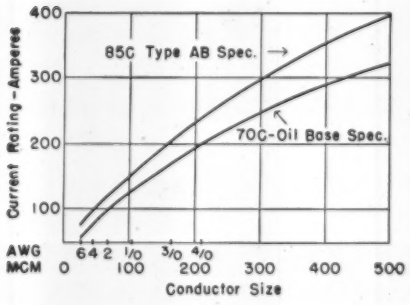
Broach

This hydraulic, horning-type press broaches 30 external involute gear teeth on the outside diameter of a bronze synchronizer ring.

The broaches are mounted in a stationary broach pot through which the part is pushed. Ten in-

Greater current-carrying capacity of Type AB butyl high-voltage cable helps users cut costs, use new or existing facilities more efficiently.

Cable that takes the squeeze out of crowded conduits



85C OPERATING TEMPERATURE rating of Anaconda Type AB cable affords 22% more current-carrying capacity than 70C rated materials, when installed in conduit at 40°C ambient temperature.

Now you can obtain the same amount of current with a smaller cable... or more current with the same size cable—with Anaconda's Type AB butyl high-voltage insulation.

For Anaconda Type AB butyl-insulated cable is recommended for operation at *85C operating temperature*. Industry specifications recommend 70C for oil-base insulations. Thus, as the curves on the chart show, Type AB delivers 22% more current-carrying capacity . . . and more amps per dollar.

New Engineering Bulletin EB-27 gives you full details on performance of Type AB insulation in 15 Industry Specification Tests. Ask the Man from Anaconda for your copy. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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ANYTIME, ANYWHERE

Dozens of Acme-Gridleys—the "heart" of mass production lines—idle in the smouldering rubble. When these machines had cooled down, they were sent to our plant where immediately upon arrival they were disassembled, new parts ordered from stock and machines then routed through our assembly line for reassembly and testing.

Within six weeks all but a few of these automatics were on their way back to the customer —ready once again to do their job.

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The NAMCO nameplate on your machine assures service — in emergency or normal situations — when and where you need it.

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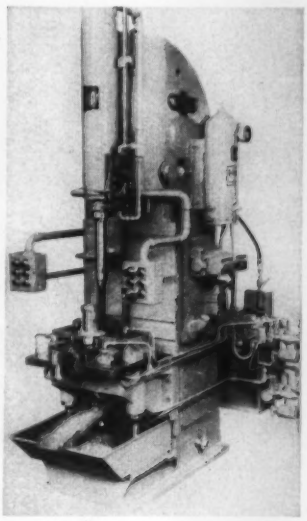
NEW PRODUCTS and equipment

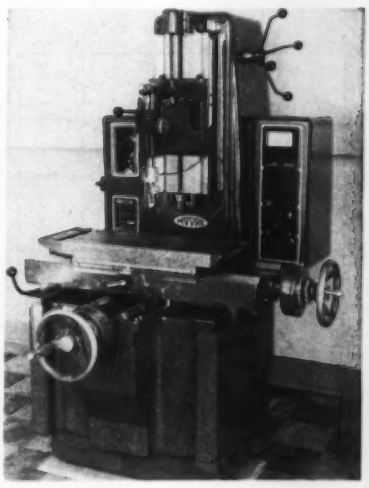
volute spline broach rings are mounted in the pot. The pot also acts as a guide for the push bar during the broaching stroke.



With the machine running on continuous automatic cycle, all the operator need do is keep the machine filled with parts. Top production is about 300 pieces an hour. *Write*: American Broach & Machine Co., 415 W. Huron St., Ann Arbor, Mich. *Phone*: Normandy 2-5621

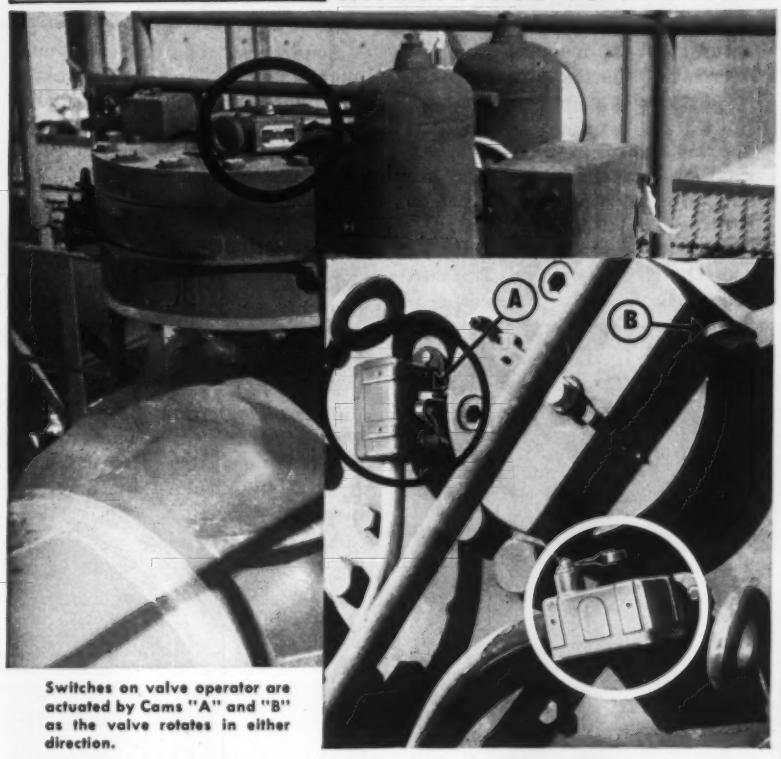
Universal Measuring

This machine inspects precisely. A combination of rectilinear and angular positioning makes possible the measurement of the most com-



MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



Switches on valve operator are actuated by Cams "A" and "B" as the valve rotates in either direction.

Explosion-proof switches provide automatic control on valve operator

MICRO SWITCH explosion-proof switches were installed on the gas valve operator by the engineer of a Texas gas company to provide safe and automatic control.

Two switches were placed so that they may be operated by cams as the valve rotates in either direction. The switches control the gas supply and turn on indicating lights when the valve is turned to either extreme position by the pressure of natural gas which it contains. The valve-operator is electrically controlled but is powered by gas.

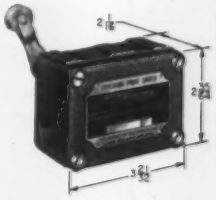
Double-pole, double-throw switches are used because each switch is required to perform two functions. When the valve reaches either limit, one of the switches is actuated to open or shut off the supply of gas and turn on a light on the control panel, which shows the position of the valve.

Explosion-proof switches are used to insure that no escaping gas will be ignited when electrical contact is made.

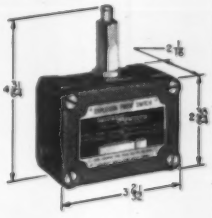
This installation is typical of thousands of such uses, which plant operating men, plant engineers, and maintenance superintendents are making of MICRO precision switches on present plant equipment. Production is increased by making machinery more automatic. Both operators and machines are protected when switches are used to prevent premature operation of equipment.

MICRO SWITCH Explosion-proof Switches (EX Series)

MICRO SWITCH "EX" Series of explosion-proof switches are listed by Underwriters' Laboratories for use in hazardous atmospheres of Class I, Group C (ethyl ether vapor) and Group D (gasoline, petroleum naphtha, alcohols, acetone, lacquer solvent vapors and natural gas); Class II, Group E (metal dust), Group F (carbon black, coal or coke dust), and Group G (grain dust)



This switch, which is shown in action in the gas company installation, is designed for cam or slide operation. The actuator arm is operated by clockwise rotation and is adjustable through 360°. Standard contact arrangement is single-pole, double-throw.



This push-rod plunger switch is designed for use as a limit switch on in-line motion applications. A stop ring near the plunger tip limits the overtravel and permits a steady load of as much as 100 pounds on the plunger without injury to the enclosed precision switch. Standard contact arrangement is single-pole, double-throw.

ELECTRICAL RATINGS

15 amperes 125, 250 or 460 volts a-c; ½ ampere 125 volts d-c; ¼ ampere 250 volts d-c.

Other explosion-proof switches in the MICRO "EX" Series include a cross roller lever switch for use where the operating mechanism approaches from a direction perpendicular to the longitudinal axis of the switch. The switch is also available with a large paddle-shaped actuator for manual control of power equipment.

Send for Catalog 101 "Switches for Industry"

MICRO SWITCH distributors are located in key cities everywhere. They have full stocks of switches for plant use applications. Look in the Yellow Pages under "Switches, Electric."

MICRO SWITCH

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NEW PRODUCTS and equipment

plex contours.

The machine has a capacity of 11 x 12 x 18 in. and is available with an electronic indicator supported on an accurate, rotatable spindle or a universal microscope for pickup.

Master lead screws give table positioning in two directions. All ways are of hardened, ground and lapped steel, fitted to hand-scraped cast iron. These ways, prismatic in section, eliminate the need for gibs or adjustments.

A rotary table provides angular positioning accuracy compatible with the co-ordinate positioning accuracy of the machine table. The microsine table extends the same accuracy to compound angular settings.

Accuracy of positioning in longitudinal travel is 0.00001-in. in 1 in. The greatest error over the entire 18 in. is 0.00003-in.

Greatest error in any 1-in. of crosstravel is 0.00001-in. The maximum error over the 11 in. is 0.000025-in.

Dial graduations are made of 500 lines, 0.003-in. wide. Settings can be repeated to 0.000005-in.

Squareness of the compound slide is 0.000025-in. Squareness of the spindle and housing is 0.00003-in. *Write*: Moore Special Tool Co., 740 Union Ave., Bridgeport 7, Conn. *Phone*: Forest 6-3224

Self-Aligning Bearings

During operation this bearing continuously adjusts for variations up to ½-in. per foot of distance between bearing centers.

A nylon insulator prevents the unit from corroding to the shaft. The felt seal which conforms to the bearing's surface is not compressed or expanded as the alignment is adjusted.

Two sizes cover shaft diameters from ¾ to 1⅜-in. Where installation space is limited the flange diameter can be reduced. *Write*: Cleveland Graphite Bronze Co., 17000 St. Clair Ave., Cleveland 10, O. *Phone*: Ivanhoe 1-7221

Die Steel

MC steel, a medium-carbon, alloy die steel, provides high surface finishes in molds and cavities.

The steel can be deep hardened uniformly from 300 to 350 Brinell through sections as large as 10 x 20 in. For high surface hardnesses, the steel is carburized and oil quenched.

MC steel comes annealed or heat treated to 300 Brinell (still readily machinable). It is sold in large rounds or blocks. *Write*: Vanadium-Alloys Steel Co., Latrobe, Pa. *Phone*: Keystone 7-5551

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NEW Literature

Write directly to the company for a copy

Nylon Molding Powder

A molybdenum filled molding powder has superior wearing and frictional properties. National Polymer Products Inc., 125 N. Fourth St., Reading, Pa.

Fire Pumps

Bulletin B-1500 (36 pages) covers over 120 fire pumps and their fittings in selection charts. Peerless Pump Division, Food Machinery & Chemical Corp., 301 West Ave. 26, Los Angeles 31, Calif.

Ramming Mix

Here is a bulletin on the uses and fusion points of a mullite mix for industrial refractory linings where high resistance to molten metal and slag penetration is needed—2 pages. J. H. France Refractories Co., 1944 France Rd., Snow Shoe, Pa.

Thread Milling

Case histories and tables of feeds and speeds are included in this 16-page bulletin on semiautomatic thread milling machines. Hanson-Whitney Co., division of Whitney Chain Co., Hartford, Conn.

Paint Stripper

A folder tells of an alkaline stripping material that removes paint, phosphate coatings, rust and oil. Oakite Products Inc., 134E Rector St., New York 6, N. Y.

Contour Machining

A report on contour machining contains 24-pages of developments in tracer-controlled production methods. True-Trace Corp., 9830 E. Rush St., El Monte, Calif.

Tool Steels

Bulletin C. S. 20-011 describes an air-hardening, high-carbon, high-chromium die steel with good machinability. Bulletin C. S. 10-082 covers a tungsten-molybdenum, high-speed steel to which alloy sulphides have been added for better machinability and tool life. Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.

Powder Metallurgy

A bibliography of periodical references to powder metallurgy has nearly 250 listings. Harper Electric Furnace Corp., 39 River St., Buffalo 2, N. Y.

Heat Exchangers

Bulletin PE-33, 16 pages, gives design information for modular shell and tube heat exchangers made of Pyrex glass. Plant Equipment Sales, Corning Glass Works, Corning, N. Y.

Metal Lathing

A 16-page booklet lists specifications for metal lathing and furring. Metal Lath Manufacturers Association, Engineers Bldg., Cleveland 14, O.

Water Stills

Technical information on stills with capacities from ½ to 1000 gallons an hour is presented in catalog G, 48 pages. Barnstead Still & Sterilizer Co., 235 Lanesville Terrace, Boston 31, Mass.

Cemented Carbides

Cutting speeds, tool geometries and machine tool horsepower requirements are included in a discussion of carbide tools, holders, inserts and blanks—catalog GT-310, 66 pages. Carboloy Department, General Electric Co., Detroit 32, Mich.

Ball-Bearing Units

Quiet, rubber-cushioned, ball-bear-

"Doc! It's like fighting DERMATITIS with an armored glove."

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— easily washed away.

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For skin exposed to acids, alkalies and inorganic chemicals:
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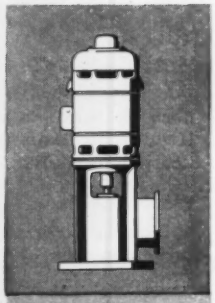
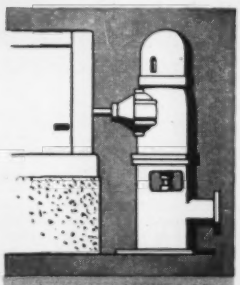
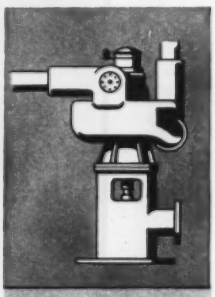


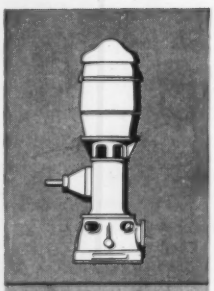
Electric Motors



Internal Combustion Engines



Steam Turbines



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Verti-Line Pumps are designed and engineered for such jobs as booster service, fire protection, cooling, transfer and general service pumping of water and other fluids, corrosive and non-corrosive – *Verti-Line Pumps are not just another deepwell pump adapted to industrial service.*

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NEW LITERATURE

ing units for heating and air conditioning equipment are covered in a 6-page bulletin. Fafnir Bearing Co., New Britain, Conn.

Electric Fork Trucks

Bulletin 1328-A, 6 pages, describes trucks with 7000, 8000 and 10,000-lb capacities. Baker-Raulang Co., 1250 W. 80th St., Cleveland 2, O.

NEW BOOKS

Physical Metallurgy and Heat Treatment of Titanium Alloys, Mallory-Sharon Titanium Corp., Niles, O. 54 pages, $1.

Here is detailed information on hardening and annealing. The book contains 32 illustrations and ten tables.

Engineering Manual for Control of In-Plant Environment in Foundries, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. 152 pages, $7.75.

Materials and processes that influence health, ventilation and comfort in the foundry are discussed. Remedies are presented.

Design Manual Roller and Silent Chain Drives, Association of Roller and Silent Chain Manufacturers, P.O. Box 5398, Indianapolis, Ind. $3.50.

Written for student and practicing engineer, this manual covers the theoretical and practical engineering principles involved in the use of chain drives.

Oxyacetylene Welding, Fourth Edition, Morgan H. Potter, American Technical Society, 848 E. 58th St., Chicago 37, Ill. 140 pages, $2.50.

This book presents modern shop practices of welding, hard surfacing, lead burning and cutting.

Lorco Method of Precision Barrel Finishing for Metals and Plastics, Dept. AC, Lord Chemical Co., 2068 S. Queen St., York, Pa. 44 pages, 50 cents.

This handbook tells how to get the best results from tumbling. It describes techniques developed around a series of 27 chemical compounds.

Standards and Dimensions for Taps and Dies, Tap & Die Division, Metal Cutting Tool Institute, Chrysler Bldg., 405 Lexington Ave., New York 17, N. Y. 80 pages, $1.25.

Tables give thread limits and tolerances, basic thread dimensions and tap drill sizes. Standard marking system is described and terms are defined.

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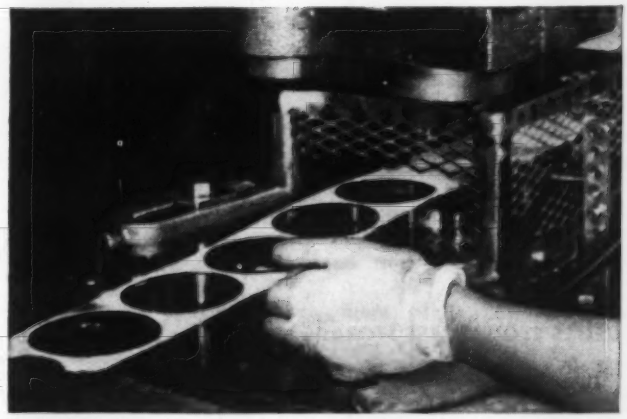
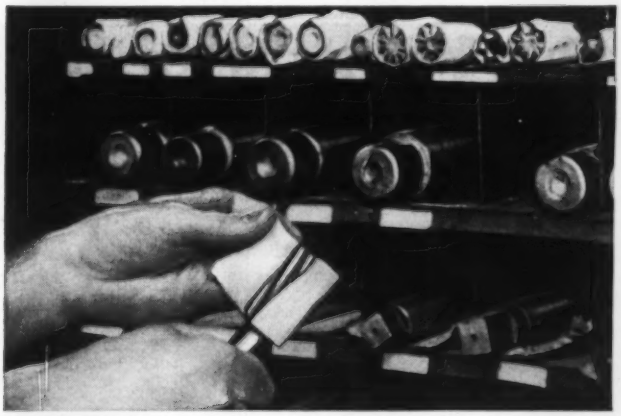


Controlled Strength aids fabrication work. No rejections due to scratches or rough fragments left on stainless steel by this punch-press operation, thanks to the superior cushioning and abrasion-resistance of low-cost Polyken Tape No. 113. Speedy, clean removal.



Controlled Strength guards tools in storage. Polyken Tape No. 133 provides a durable cloth backing for sharp cutting edges . . . yet it pulls off clean and quick when the tools are ready for use.

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When you need special qualities, there's a *Polyken* Controlled Strength that has them.

That way—the Controlled Strength way—you do the job *right* (whether it be sealing, holding, bundling or protection) for the *least* amount of money.

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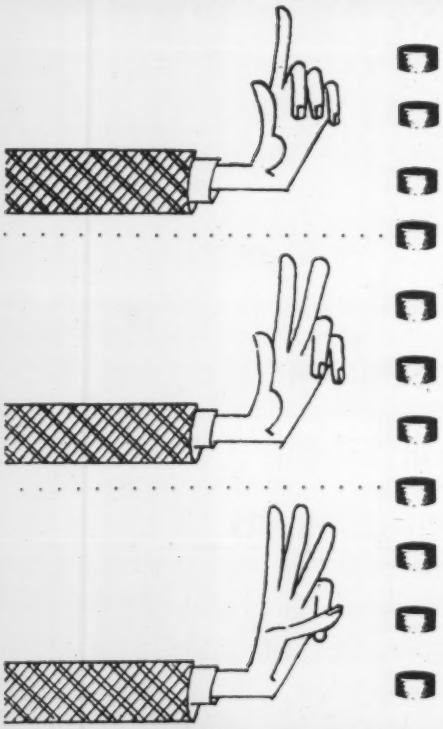

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You can increase machine tool scrap value *$20.00 and more per ton* . . . by converting bulk turnings, borings and chips into briquettes. Classified as high-grade scrap, briquettes can be charged directly into a furnace or foundry cupola.

BRIQUETTES ARE EASIER TO HANDLE

Small and uniform in size, briquettes eliminate many scrap handling problems. Current users of Milwaukee automatic briquetting presses include leading manufacturers of automobiles, aircraft, farm implements, plumbing supplies, auto parts and other high-production items.

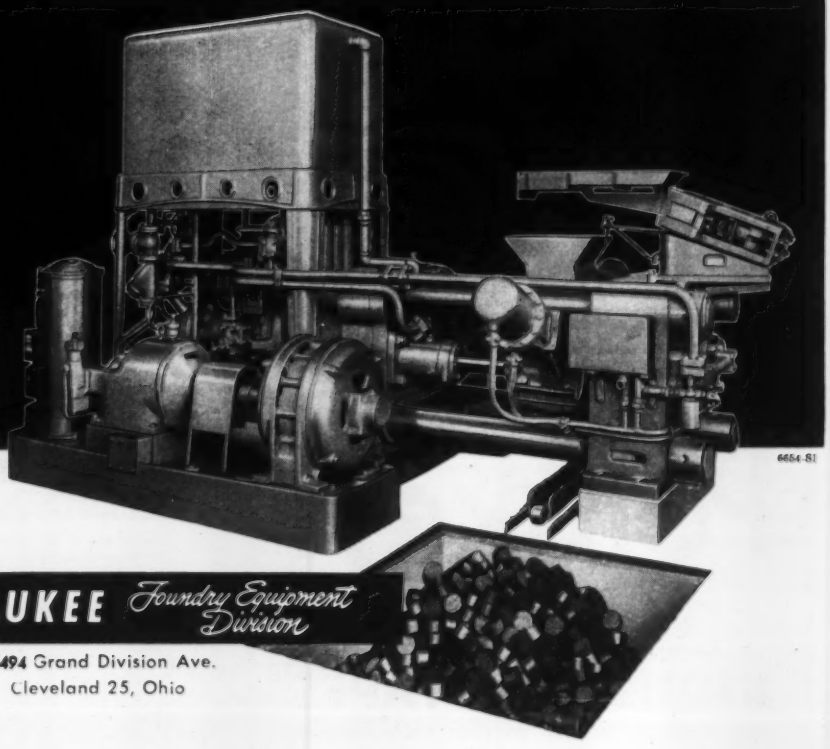
BRIQUETTES REQUIRE LESS STORAGE SPACE

Compact briquettes also greatly reduce scrap storage space. Many users, through increased profits and savings, write off initial machine cost in the first year.

Milwaukee briquetting presses are available in six sizes...capacities range from ¾ to 3½ tons per hour.

. . . WITH A *MILWAUKEE* BRIQUETTING PRESS

For complete data and specifications, write for Bulletin 117.



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MILWAUKEE *Foundry Equipment Division*

6494 Grand Division Ave.
Cleveland 25, Ohio

Market Outlook

TAKE all of the steel you can get at regular prices for delivery by the end of June.

Prices will go up at midyear, and demand will continue to be strong.

A few consumers have reduced their demand, and a few others have asked that shipments be delayed. It will pay you to take advantage of any of these openings.

PRESSURES—It's a foregone conclusion the steelworkers will win some concessions in their forthcoming contract negotiations, and it's equally certain that steel price increases will follow. That's not the only upward pressure on prices. Steel producers are having to pay more for replacement of plant and equipment, and the recent rail freight rate increase is adding to the cost of getting raw materials into mills.

Kaiser Steel Corp. raised prices last week $1 to $2 a ton to help cover increased rail freight costs on materials it uses. Tin mill products are going up, too, although the effective date for the increases was delayed a month —to Apr. 30. They're going up 40 cents a base box, a rise of about 5 per cent.

MORE TO SPEND—Steel demand will be kept high by the needs of the heavy goods industries and also by increased income of individuals. Per capita income in January was $1874, up 5.1 per cent over the $1782 of a year earlier. In contrast, the cost of living rose only two-tenths of 1 per cent. It leaves them more to spend.

VALUABLE—Any inventories that can be built up by July 1 may be welcome. They would be protection in event of a steelworkers' strike, or a steel production drop resulting from summer vacations and hot weather. Inventories are modest. In the last 14 months, users have added just about enough for 17 days of consumption at current rates.

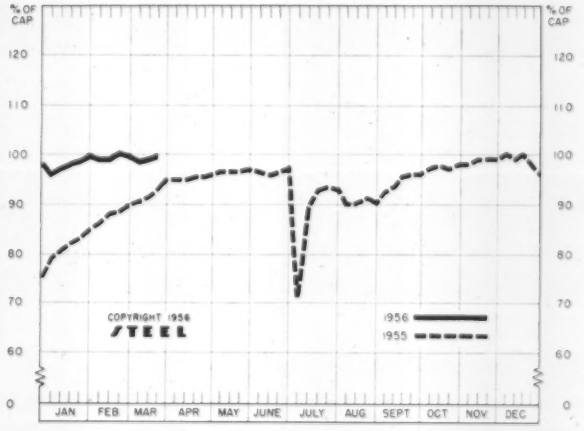
PICK-UP—Already, some areas (particularly the East) are noting a renewal of inquiries for cold-rolled carbon steel sheets. Demand for them eased slightly when automobile production slackened at the turn of the year. The near-term automotive outlook is brightening, and early introduction of 1957 models is expected to make the auto business racy early in the last half of this year. This will take steel.

Meanwhile, the construction industry (second largest user of steel) will be calling heavily on the steel output. Some shops which fabricate steel for bridges are booked up through the second quarter of 1957. Demand for seamless tubing exceeds supply. As a result, some electric power plant expansions are being delayed for lack of the material.

HIGH SPEED—Mills are trying to fill the needs. In the week ended Mar. 18 they turned out steel for ingots and castings at 99.5 per cent of their rated capacity, compared with 99 per cent in the preceding week. At the rate they're going, they'll set a new monthly production record in March. The record is held by January of this year.

PRICES—Despite minor price increases of the last week, STEEL's price composite on finished steel holds at $128.02 a net ton. Steelmaking scrap prices strengthened again and pushed STEEL's scrap price composite to $49.17 a gross ton, a 67-cent rise over the preceding week.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Mar. 18	Change	Same Week 1955	Same Week 1954
Pittsburgh	102	— 0.5*	93.5	73
Chicago	99	— 1.5*	97	79
Mid-Atlantic	100	0	89	62
Youngstown	98	+ 1	96	66
Wheeling	97	+ 0.5	93.5	79.5
Cleveland	99.5	— 4*	98	61
Buffalo	105	0	99	63.5
Birmingham	87.5	— 8.5	87.5	83
New England	80	+ 5	85	60
Cincinnati	99.5	+ 2	90.5	71.5
St. Louis	106	0	87	43.5
Detroit	100	— 0.5	88	84
Western	102	— 2	94	73
National Rate	99.5	+ 0.5	93	68

INGOT PRODUCTION‡

	Week Ended Mar. 18	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	151.5†	153.3	151.5	141.5
NET TONS (In thousands)	2,433†	2,462	2,433	2,273

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 37

Technical Outlook—p. 93

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Mar. 13 1956	Mar. 6 1956	Month Ago	Feb. Average
(1947-1949=100)	157.1	157.1	157.1	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 13

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	167.250
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.425	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.800	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.275	Wire, Drawn, Stainless 430 (lb)	0.590
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.473
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.603
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 14 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	209.10	209.10	209.10	194.53	171.92
Index in cents per lb	5.665	5.665	5.665	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.02	$128.02	$128.02	$117.82	$106.32
No. 2 Fdry Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	49.17	48.50	49.00	37.50	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 14 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.93	4.90	4.90	4.55	4.18
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	5.00	4.88	4.88	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.60	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, ⅞-⅝" Pitts.	5.375	5.375	5.375	4.675	4.10-4.30
PIG IRON, Gross Ton					
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.00	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	205.00†	205.00†	205.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$48.50	$48.50	$49.00	$38.50	$45.00
No. 1 Heavy Melt, E. Pa.	50.00	50.00	51.00	39.00	43.50
No. 1 Heavy melt, Chicago	49.00	47.00	47.00	35.00	43.50
No. 1 Heavy Melt, Valley	52.50	52.50	52.50	37.50	45.00
No. 1 Heavy Melt, Cleve.	50.50	49.50	49.50	35.00	44.00
No. 1 Heavy Melt, Buffalo	47.50	46.50	46.50	32.50	44.00
Rails, Rerolling, Chicago	66.50	65.50	66.00	49.50	52.50
No. 1 Cast, Chicago	48.50	46.50	46.50	40.00	49.00
COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

Daily Nonferrous Price Record

	Price Mar. 14	Last Change	Previous Price	Feb. Avg.	Jan. Avg.	Mar. 1955 Avg.
Copper	46.00-54.00	Mar. 13, 1956	46.00-53.00	48.076	46.700	33.222
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.960	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.500	13.440	11.500
Tin	101.875	Mar. 14, 1956	101.75	100.908	105.067	91.176
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug. 8, 1955	23.20-24.40	24.400	24.400	23.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.556

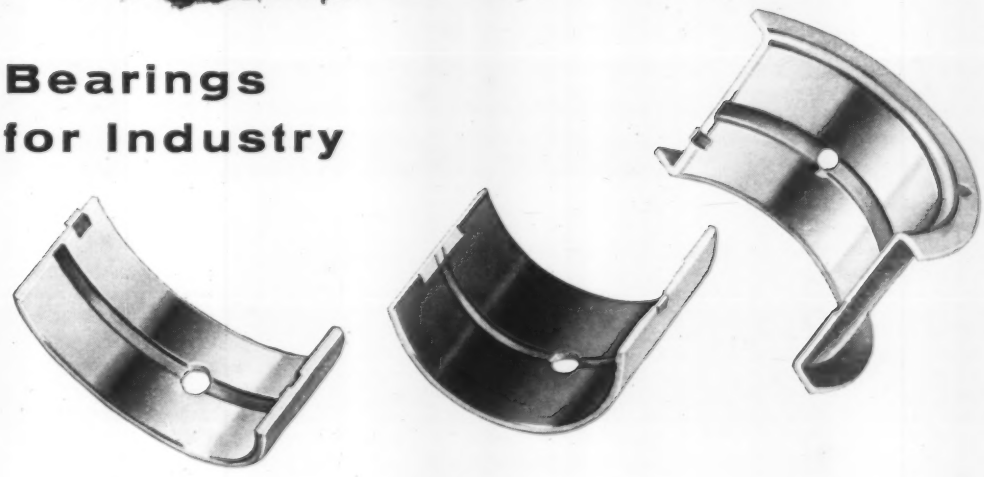
Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

Every sleeve bearing must be precisely engineered for the job to be done. Load, speed, temperature and many other critical requirements must be met. Continuous research, engineering and metallurgy enables us to meet these exacting requirements on a wide variety of mechanical assemblies . . . for which we produce millions of bearings each year.

Bearings for Industry



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Nonferrous Metals

Record profits in 1955 by most nonferrous companies may bring turbulent labor negotiations unless management and labor are willing to compromise

Nonferrous Metal Prices, Pages 146 & 147

THE NONFERROUS industry's annual reports may be the springboard to more labor troubles this fall. It's conceivable that the cycle of events which brought about the present high prices in the copper industry could repeat.

Take a look at these annual reports from the viewpoint of a labor union leader. He sees: Net earnings at International Nickel Co. in 1955 were $91,566,000 vs. $65,295,000 for 1954. Much of the gain was in higher copper prices. American Smelting & Refining Co. rang up net income of $33.5 million, a jump of $12.1 million over 1954. Phelps Dodge Corp. made $72.3 million after realizing only $41.2 million the previous year. Aluminum Co. of America posted earnings of $87,600,808, an increase of 41.58 per cent over 1954. Kennecott Copper Corp. earned $125,516,291 in 1955 and only $77,906,288 the year before. So from a profit angle, the labor leader sees only a bed of roses for the producers, and he will want a few buds from the garden for his boys.

Vicious Circle—This, of course, leads to the inevitable wage and fringe-benefits demands, which, in turn, lead to work stoppages. Producers' costs rise and supply becomes critical. Producers are "forced" to raise prices, and it all starts over again. Preposterous? Perhaps, but it was just one short year ago that copper stood at 33 cents a pound. Look at it today: Anywhere from 46 cents a pound up.

There is much more to these reports than huge profits—expansion plans, increased production, current assets. But on the basis of industry profits, union leaders probably will take their cues from steel union demands, and they'll have a powerful club in the battle.

What To Do?—Management will have to be ready to grant substantial pay boosts. Fringe benefits, including some SUB-type programs, may have to be approved. Labor will have to take a more mature look at the annual reports and be willing to settle on a compromise set of fringe benefits and pay raises if nonferrous production is to be kept at peak levels and benefit both workers and producers. But if there is anything to the theory of history repeating itself, the blue chips will be with the man who bets on one or two major work stoppages before the third quarter gets under way.

Rockwell Abhors Nickel Hoard

Drastic price increases from 50 to 500 per cent; $10 million spent in the gray market by automotive companies; a drive by automotive industry to find substitutes; the threat of permanent damage to the bumper industry, which has $80 million in invested capital and employs 50,000 trained workers—these are just a few of the results of the government's unrealistic policy of hoarding nickel for a five-year war when most experts accept the concept of a "short war," says Col. Willard F. Rockwell, chairman of Rockwell Mfg. Co. He maintains that the nickel stockpile program is "unnecessary and asinine." It threatens the foundation of many American industries and the jobs of tens of thousands of their employees.

"Unfortunately, this hoarding has gone too far to be halted abruptly without creating havoc," he says. "World authorities on mining say that nickel is being produced at a rate 50 per cent in excess of the current record peacetime consumption and that, if our government withdrew from the market, many nickel ore mines would be forced to close."

Colonel Rockwell said that investigations indicate much of the gray-market nickel is coming from government contractors who are overallocated. They don't balk at selling 65-cent metal for $2 a pound.

Estimated Consumption of Aluminum

1955—net tons

U. S.	1,951,000
United Kingdom	411,300
West Germany	268,500
France	163,450
Canada	94,500
Italy	91,650
Japan	55,500
Switzerland	36,300
Sweden	36,300
India	30,200
Australia	23,900
Holland	15,400
Brazil	14,500
Norway	13,900
Mexico	11,500
Denmark	9,800

Source: Aluminum Co. of Canada

Copper Scrap Still Scarce

As far as the government is concerned, there is still a shortage of copper-base scrap. So said William A. Meissner Jr., deputy director of the Copper Division, Business & Defense Services Administration, before the annual meeting of the National Association of Waste Material Dealers. There is a growing feeling in Washington that second-quarter export quotas will not be released until current investigations into copper trade with Iron Curtain countries is resolved, Mr. Meissner said. Last year, 6 per cent of the copper-base scrap was exported. Scrap dealers feel the market has loosened enough to up that figure.

Mr. Meissner said that BDSA has recommended further deferrals of copper destined for stockpile in the second quarter. The agency has requested that quantities due to stockpile be reapportioned so that shipments do not begin to snowball in any one calendar quarter.

Market Memos

- A bill soon will be introduced in Congress to take everything to do with minerals out of the Interior department and put in under a new cabinet-level Department of Mineral Resources.
- Congress also may get bills which in effect would extend price supports for domestic producers of asbestos, beryl, chrome, columbium-tantalum, manganese and mica. They would be similar to the one for tungsten introduced by Sen. James E. Murray (Dem., Mont.), see page 50.
- Maurice D. Schwartz, Pacific Smelting Co., told the NAWMD meeting: "I am of the opinion that the zinc market will remain at about the present level and do not foresee any conditions which would warrant a rapid price increase."

The Moteramic 38 Taximeter
Manufactured by
THE VIKING TOOL & MACHINE CORP.
2 MAIN STREET • BELLEVILLE, N.J.

"THE BERYLLIUM COPPER CASTINGS IN THIS TAXIMETER WILL OUTLAST THE TAXI!"

The gears and cams used in this taximeter bear against steel pins and shafts. Steel castings won't hold up—as steel wears on steel, shafts are worn, holes elongated, and tolerances expanded to the point that the meter operates erratically.

In four of the most critical, high-friction wear points, cast "BERYLCO" brand beryllium copper parts are now providing these necessary advantages:

Machining costs are obviated—in castings, beryllium copper yields an end product consistent with original mold design, achieving tolerances of .0005".

The delicate lobes, ratchets, cams and teeth that characterize the four cast parts could only be molded by beryllium copper —no other alloy would hold such fine detail.

The parts are susceptible to rust and corrosion . . . an ever-present problem with steel which has been eliminated altogether by using beryllium copper alloys.

A Rockwell of C-37 to C-43 is achieved by a simple heat treatment. The part is first solution annealed at 1475°F. for 3 hours and water quenched immediately . . . then heat treated at 600°F. for 2 hours and air cooled. The expansion of the part during heat treatment is controlled to within .002", far less than with comparable materials. Expensive machining costs are prevented, since the part is pin-pointed to the design specifications in the original cast.

There has never been a failure of any beryllium copper part in the taximeter, even though these meters are used in the nation's toughest proving ground—the New York City taxi service. On the testing rack, each meter is run for 2000 miles at 120 mph and 25% overvoltage, plus 700 miles under regular conditions. Part wear and clearances are exactingly checked, and it is here that these cast "BERYLCO" brand beryllium copper parts have demonstrated that they will outwear and outlast the service life of any taxi on the road.

A technical bulletin (#32) discussing in detail the use of "BERYLCO" brand beryllium copper castings as they are used in this taximeter is available upon request. This bulletin is instructive reading, and we recommend that it be made a part of your permanent files. Write to:

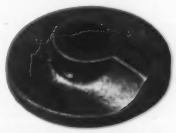
THE BERYLLIUM CORPORATION

BERYLCO

DEPT. 6B, READING 19, PENNSYLVANIA

"BERYLCO" Brand Beryllium Copper is Shelf-Stocked by Leading Warehouse Distributors.
Export Department, Reading, Pennsylvania • Cable Address "BERYLCO"

FLAG INDEXING CAM; one of the most complicated single-cast parts ever produced . . . it has lobes, teeth, ratchets, cams, a square tapered hole, and a disengaging stop. Steel could never be cast in such a complication of design, and brass is too soft to take the beating. The tapered socket measures .628" with a tolerance of —0.005" and +0.00".



BRAKE ACTUATING CAM; a zinc alloy formerly used for this part would not stand up under the terrific amount of wear imposed . . . it would change size as much as 1/16", break, and come off the shaft. The zinc alloy was replaced by a beryllium copper casting, which, with simple heat treatment, registers a Rockwell of C-37 to C-43, more than enough to withstand the rigors of operational stress.

RATCHET HUB; used to operate the "extras" tabulation, which is actuated by a lever binding against the ratchet periphery of this part. The center hole of this part must fit over a steel stud in what amounts to a lap fit with a minimum acceptable tolerance of .001". It was impossible to maintain this tolerance with steel, and machining costs were out of proportion. The part is now cast of "BERYLCO" brand beryllium copper to specifications which require a hub of .250" with tolerances of —0.00" and +.002".

RETURN LEVER CAM; has an outside diameter of 1.565", pitch of 16, contains 23 teeth with a circular pitch of .1963". The depth of the teeth is .1348", and the thickness of the teeth .098". Used to reset the dollar and cents scale, this cam is under very high spring tension at all times, and nothing but the most hardened material could withstand this duty.

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 24.40; pigs 22.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. Valley; 46.00 deld. Midwest: custom smelters, 54.00 deld.; Lake, 46.00 deld.; Fire refined, 45.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99+, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 32.50 f.o.b. Velasco, Tex.; ingot, 33.25 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 31.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 36.00 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $261-$265 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $90-$100, nom. per troy oz.

Palladium: $23-$24 per troy oz.

Platinum: $97-$110 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $120-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 91.125 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 101.875; prompt, 101.75.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45; grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 30.25-32.75; No. 12 foundry alloy (No. 2 grade), 29.00; 5% silicon alloy, 0.60 Cu max, 30.50-31.25; 13 alloy, 0.60 Cu max, 30.50-31.25; 195 alloy, 30.50-31.25; 108 alloy, 29.00-29.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 29.75-30.25; grade 2, 28.75; grade 3, 28.00; grade 4, 27.50-28.50.

Brass Ingot: Red brass, No. 115, 44.00; tin bronze, No. 225, 58.00; No. 245, 50.75; high-leaded tin bronze, No. 305, 47.75; No. 1 yellow, No. 405, 34.75; manganese bronze, No. 421, 39.25.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.87; rod, bar, wire, $1.84.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.355; l.c.l., 51.98. Weatherproof, 30,000-lb lots, 48.28; l.c.l., 49.03. Magnetic wire deld., 15,000 lb or more, 58.68; l.c.l., 59.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00-24.00; ribbon zinc in coils, 21.50; plates, 20.00-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks		71	

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4		
0.156-0.172	57.5	55.9		
0.188	57.5	55.9		71.7
0.219-0.234	54.5	52.9		
0.250-0.281	54.5	52.9		68.4
0.313	54.5	52.9		65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1		52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9		
1.625-2.000	48.2	46.2		50.5
2.125-2.500	47.0	45.0		
2.563-3.375	45.6	43.6		

ALUMINUM

Sheet and Circle: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 99.00; .064 in., 78.00; .125 in., 63.50; .250-2.0 in., 61.00. AZ31A special grade, .032 in., 145.00; .064 in., 100.00; .125 in., 83.00; .250-2.0 in., 79.00. Tread plate, .125 in., 68.00; .250-3.0 in., 64.00. Tooling plate, .250-3.0 in., 65.00.

Extrusions	Com. Grade (FS)	Spec. Grade (AZ31B)
1 in. diam. rod	61.50	73.00
Shapes: 0.3 lb/ft	65.40-72.40	76.90-83.90
1.0 lb/ft	61.90-67.30	73.40-78.80
4.0 lb/ft	57.70-62.20	69.20-73.70
2 in. OD x ⅛ in. w. tubing	74.50	86.00

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 20.00-20.50; old sheets, 17.00-17.50; borings and turnings, 11.00-11.50; crankcases, 17.00-17.50; industrial castings, 17.00-17.50.

Copper and Brass: No. 1 heavy copper and wire, 43.00-43.50; No. 2 heavy copper and wire, 41.00-41.50; light copper, 38.50-39.00; No. 1 composition red brass, 33.00-33.50; No. 1 composition turnings, 32.00-32.50; yellow brass

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	67.13b	64.36c	....	67.32	42.000	42.000	41.250
Yellow Brass	55.60	45.65d	56.14	58.51	31.250	31.000	29.000
Low Brass, 80%	60.15	60.09	60.69	62.96	35.375	35.125	34.625
Red Brass, 85%	61.79	61.73	62.33	64.60	37.000	36.750	36.250
Com. Bronze, 90%	63.98	63.92	64.52	66.54	38.500	38.250	37.750
Manganese Bronze	62.84-62.75	56.65-56.74	67.09	....	29.250	29.000	28.500
Muntz Metal	56.94	52.75	....	....	29.125	28.875	28.375
Naval Brass	58.90	53.21	65.96	62.06	29.000	28.750	28.250
Silicon Bronze	70.48	69.67	70.52	72.66e	40.750	40.500	39.750
Nickel Silver, 10%	69.20	71.53g	51.53	....	34.625	34.375	17.313
Phos. Bronze, A, 5%	85.37	85.87	85.87	87.05	42.625	42.375	41.375

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

turnings, 19.50-20.50; new brass clippings, 28.00-28.50; light brass, 20.00-20.50; heavy yellow brass, 22.50-23.00; new brass rod ends, 26.50-27.00; auto radiators, unsweated, 25.00-25.50; cocks and faucets, 25.50-26.00; brass pipe, 26.00-26.50.

Lead: Heavy, 12.75-13.00; battery plates, 6.50-6.75; linotype and stereotype, 14.00-14.50; electrotype, 13.25-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 60.00-70.00; old sheets, 55.00-70.00; turnings, 50.00; rods, 59.50-70.00.

Nickel: Sheets and clips, 100.00-150.00; rolled anodes, 100.00-150.00; turnings, 85.00-125.00; rod ends, 100.00-150.00.

Zinc: Old zinc, 6.00-6.50; new die-cast scrap, 6.00; old die-cast scrap, 3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 22.25-22.50; 3003 clippings, 22.00-22.50; 6151 clippings, 21.75-22.25; 5052 clippings, 21.75-22.25; 2014 clippings, 21.75; 2017 clippings, 21.50-21.75; 2024 clippings, 21.50-21.75; mixed clippings, 21.00-22.00; old sheet, 19.50-20.00; old cast, 19.50-20.00, clean old cable (free of steel), 21.75-22.25; borings and turnings, 19.50-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 68.00; light scrap, 63.00; turnings and borings, 48.00.

Copper and Brass: No. 1 heavy copper and wire, 46.00; No. 2 heavy copper and wire, 43.50; light copper, 42.00; refinery brass (60% copper) per dry copper content, 39.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 46.00; No. 2 heavy copper and wire, 43.50; light copper, 42.00; No. 1 composition borings, 35.50; No. 1 composition solids, 36.00; heavy yellow brass solids, 26.00; yellow brass turnings, 25.00; radiators, 27.50-28.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 63.79; oval, 62.92, 5000-10,000 lb; electrodeposited, 61.25, 2000-5000 lb lots; cast, 58.85, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab; less than 200 lb, $1.205; 200-499 lb, $1.190; 500-999 lb, $1.185; 1000 lb or more, $1.180.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

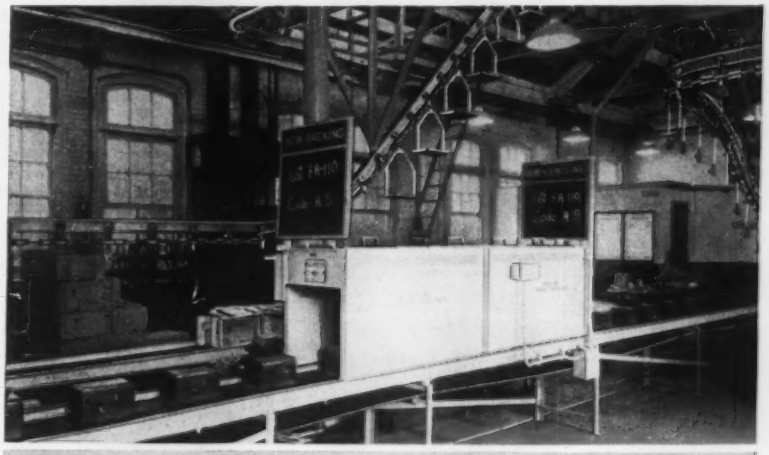
Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 72.30; 100-600 lb, 63.80; 700-1900 lb, 61.30; 2000-9900 lb, 59.60; 10,000 lb or more, 58.40.

Stannous Chloride (anhydrous): Less than 25 lb, $1.696; 25 lb, $1.346; 100 lb, $1.196; 400 lb, $1.171; 5200-19,600 lb, $1.049; 20,000 lb or more, 92.70.

Stannous Sulphate: Less than 50 lb, $1.322; 50 lb, $1.022; 100-1900 lb, $1.002; 2000 lb or more, 98.20.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.



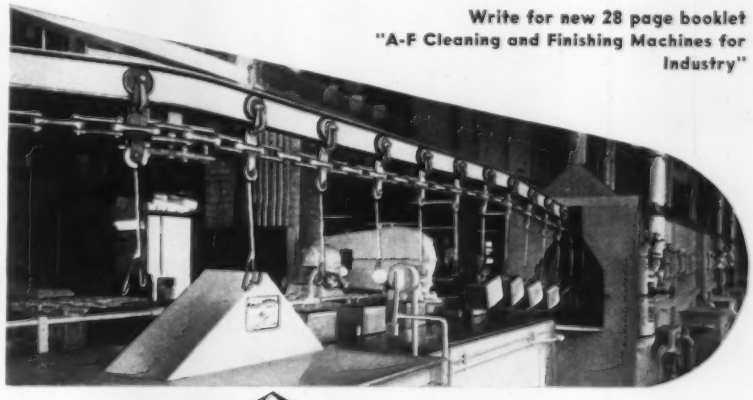
ANOTHER COMPLETELY CO-ORDINATED CONVEYING AND FINISHING SYSTEM... A-F Engineered and Manufactured

IN THIS LARGE plant, the two illustrations picture an A-F Conveyorized infra-red stencil drying unit and an A-F Overhead Trolley Conveyor carrying filled, hermetically sealed containers through a cleaning and drying unit. In all, *thirteen different operations* are performed, including tests for leaks, two washes, two rinses, drying, surface treatments, paint dippings, stenciling and infra-red drying. From unloading platform to storage and shipping, the work flows quickly, efficiently, economically!

WITH TWO correlated departments for designing, engineering and manufacturing conveying systems and metal products cleaning and finishing machines, we are unique in being able to offer you a completely co-ordinated and conveyorized cleaning and finishing system based on 55 years of experience in effecting operational savings.

There is no substitute for this experience. It can help you in many ways. Before you order a cleaning machine or conveyor—write us for an estimate. In many cases we will be low—but in *any* case your A-F *Engineered* Equipment will be right for the job it is intended to perform.

Write for new 28 page booklet "A-F Cleaning and Finishing Machines for Industry"



YOU CAN SEE THE SUPERIORITY OF A-F CONVEYOR ENGINEERING

A-F ENGINEERED CONVEYING SYSTEMS

Also Pre-Engineered Conveyors—Wheel, Trolley
Rack Washers
Metal Cleaning and Processing Machines

THE ALVEY-FERGUSON CO., 570 Disney Street, CINCINNATI 9, OHIO and Azusa, Cal.

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 149; to footnotes, page 151.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$65.50

INGOTS, Alloy (NT)

Detroit R7 .....$69.00
Houston S5 .....74.00
Midland,Pa. C18 .....69.00
Munhall,Pa. U5 .....69.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5 .....$68.50
Bessemer,Pa. U5 .....68.50
Bridgeport,Conn. N19 ..73.50
Buffalo R2 .....68.50
Clairton,Pa. U5 .....68.50
Ensley,Ala. T2 .....68.50
Fairfield,Ala. T2 .....68.50
Fontana,Calif. K1 ....78.00
Gary,Ind. U5 .....68.50
Johnstown,Pa. B2 .....68.50
Lackawanna,N.Y. B2 ..68.50
LoneStar,Tex. L6 .....74.50
Munhall,Pa. U5 .....68.50
Pittsburgh J5 .....68.50
S.Chicago,Ill. R2, U5...68.50
S.Duquesne,Pa. U5 ....68.50
Youngstown R2 .....68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 .....$84.50
Bessemer,Pa. U5 .....84.50
Bridgeport,Conn. N19 ..89.50
Buffalo R2 .....84.50
Canton,O. R2 .....86.50
Clairton,Pa. U5 .....84.50
Conshohocken,Pa. A3...89.50
Ensley,Ala. T2 .....84.50
Fairfield,Ala. T2 .....84.50
Fontana,Calif. K1 ....94.00
Gary,Ind. U5 .....84.50
Geneva,Utah C11 .....84.50
Houston S5 .....89.50
Johnstown,Pa. B2 ....84.50
Lackawanna,N.Y. B2...84.50
LosAngeles B3 .....94.00
Midland,Pa. C18 .....84.50
Munhall,Pa. U5 .....84.50
Pittsburgh J5 .....84.50
Seattle B3 .....98.00
S.Chicago R2,U5,W14 ..84.50
S.Duquesne,Pa. U5 ....84.50
S.SanFrancisco B3 ....94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ....$96.00
Buffalo R2 .....96.00
Canton,O. R2, T7 .....96.00
Conshohocken,Pa. A3..103.00
Detroit R7 .....96.00
Fontana,Calif. K1 .....117.00
Gary,Ind. U5 .....96.00
Houston S5 .....101.00
Ind.Harbor,Ind. Y1 ...96.00
Johnstown,Pa. B2 ....96.00
Lackawanna,N.Y. B2 ..96.00
LosAngeles B3 .....116.00
Massillon,O. R2 .....96.00
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
S.Chicago R2,U5,W14 ..96.00
S.Duquesne,Pa. U5 ....96.00
Struthers,O. Y1 .....96.00
Warren,O. C17 .....96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$103.50
Canton,O. R2 .....103.50
Cleveland R2 .....103.50
Gary,Ind. U5 .....103.50
S.Chicago R2, W14 ..103.50
S.Duquesne,Pa. U5 ...103.50

SKELP

Aliquippa,Pa. J5 .....4.325
LoneStar,Tex. L6 .....4.625
Munhall,Pa. U5 .....4.225
SparrowsPoint,Md. B2..4.225
Warren,O. R2 .....4.225
Youngstown R2, U5 ...4.225

WIRE RODS

AlabamaCity,Ala. R2 ..5.375
Aliquippa,Pa. J5 .....5.375
Alton,Ill. L1 .....5.55
Buffalo W12 .....5.375
Cleveland A7 .....5.375
Donora,Pa. A7 .....5.375
Fairfield,Ala. T2 .....5.375
Houston S5 .....5.625
IndianaHarbor,Ind. Y1..5.375
Johnstown,Pa. B2 .....5.375
Joliet,Ill. A7 .....5.375
KansasCity,Mo. S5 ....5.625
Kokomo,Ind. C16 .....5.475
LosAngeles B3 .....6.175
Minnequa,Colo. C10 ...5.625
Monessen,Pa. P7 .....5.375
N.Tonawanda,N.Y. B11 5.375
Pittsburg,Calif. C11 ...5.675
Portsmouth,O. P12 ....5.375
Roebling,N.J. R5 .....5.475
S.Chicago,Ill. R2 .....5.375
SparrowsPoint,Md. B2..5.475
Sterling,Ill.(1) N15 ...5.375
Sterling,Ill. N15 .....5.475
Struthers,O. Y1 .....5.375
Worcester,Mass. A7 ...5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....4.60
Aliquippa,Pa. J5 .....4.60
Bessemer,Ala. T2 .....4.60
Bethlehem,Pa. B2 .....4.65
Birmingham C15 .....5.10
Clairton,Pa. U5 .....4.60
Fairfield,Ala. T2 .....4.60
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.60
Geneva,Utah C11 .....4.60
Houston S5 .....4.70
Ind.Harbor,Ind. I-2 ....4.60
Johnstown,Pa. B2 .....4.65
KansasCity,Mo. S5 .....4.70
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.30
Minnequa,Colo. C10 ....4.90
Munhall,Pa. U5 .....4.60
Niles,Calif. P1 .....5.25
Phoenixville,Pa. P4 ....5.15
Portland,Oreg. O4 .....5.35
Seattle B3 .....5.35
S.Chicago U5, W14 ....4.60
S.SanFrancisco B3 ....5.25
Torrance,Calif. C11 ....5.30
Weirton,W.Va. W6 ....4.60

Wide Flange

Bethlehem,Pa. B2 .....4.65
Clairton,Pa. U5 .....4.60
Fontana,Calif. K1 .....5.45
Lackawanna,N.Y. B2 ..4.65
Munhall,Pa. U5 .....4.60
Phoenixville,Pa. P4 ....5.15
S.Chicago,Ill. U5 .....4.60

Alloy Std. Shapes

Clairton,Pa. U5 .....5.65
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....5.65
Houston S5 .....5.75
Munhall,Pa. U5 .....5.65
S.Chicago,Ill. U5 .....5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....6.75
Bessemer,Ala. T2 .....6.75
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.75
Fairfield,Ala. T2 .....6.75
Fontana,Calif. K1 .....7.45
Gary,Ind. U5 .....6.75
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Ind.Harbor,Ind. I-2, Y1..6.75
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....6.85
Lackawanna,N.Y. B2 ...6.80
LosAngeles B3 .....7.45
Munhall,Pa. U5 .....6.75
Seattle B3 .....7.50
S.Chicago,Ill. U5, W14..6.75
S.SanFrancisco B3 ....7.40
Struthers,O. Y1 .....6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....6.80
Lackawanna,N.Y. B2 ...6.80
Munhall,Pa. U5 .....6.75
S.Chicago,Ill. U5 .....6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....4.65
Lackawanna,N.Y. B2 ...4.65
Munhall,Pa. U5 .....4.60
S.Chicago,Ill. U5 .....4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....5.45
Lackawanna,N.Y. B2 ...5.45
Munhall,Pa. U5 .....5.45
S.Chicago,Ill. U5 .....5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.50
Aliquippa,Pa. J5 .....4.50
Ashland,Ky.(15) A10 ...4.50
Bessemer,Ala. T2 .....4.50
Bridgeport,Conn. N19 ..4.75
Buffalo R2 .....4.50
Clairton,Pa. U5 .....4.50
Claymont,Del. C22 .....4.80
Cleveland J5, R2 .....4.60
Coatesville,Pa. L7 .....4.80
Conshohocken,Pa. A3 ...4.50
Detroit M1 .....4.60
Ecorse,Mich. G5 .....4.60
Fairfield,Ala. T2 .....4.50
Fontana,Calif.(30) K1...5.20
Gary,Ind. U5 .....4.50
Geneva,Utah C11 .....4.50
GraniteCity,Ill. G4 .....4.70
Harrisburg,Pa. P4 .....5.10
Houston S5 .....4.60
Ind.Harbor,Ind. I-2, Y1..4.50
Johnstown,Pa. B2 .....4.50
Lackawanna,N.Y. B2 ...4.50
LoneStar,Tex. L6 .....4.85
Mansfield,O. E6 .....4.50
Minnequa,Colo. C10 ....5.35
Munhall,Pa. U5 .....4.50
Newport,Ky. N9 .....4.50
Pittsburgh J5 .....4.50
Riverdale,Ill. A1 .....4.725
Seattle B3 .....5.40
Sharon,Pa. S3 .....4.50
S.Chicago R2, U5, W14...4.50
SparrowsPoint,Md. B2 ..4.50
Steubenville,O. W10 ....4.50
Warren,O. R2 .....4.50
Weirton,W.Va. W6 .....4.50
Youngstown R2, U5, Y1.4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....5.65
Fontana,Calif. K1 .....6.35
Geneva,Utah C11 .....5.65
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 .....10.40

PLATES, High Strength Low-Alloy

Aliquippa,Pa. J5 .....6.725
Bessemer,Ala. T2 .....6.725
Clairton,Pa. U5 .....6.725
Cleveland J5, R2 .....6.725
Claymont,Del. C22 .....6.725
Coatesville,Pa. L7 .....7.025
Conshohocken,Pa. A3 ..6.725
Ecorse,Mich. G5 .....6.825
Fairfield,Ala. T2 .....6.725
Fontana,Calif.(30) K1 ..7.425
Gary,Ind. U5 .....6.725
Geneva,Utah C11 .....6.725
Houston S5 .....6.825
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 .....6.725
Munhall,Pa. U5 .....6.725
Pittsburgh J5 .....6.725
Seattle B3 .....7.625
Sharon,Pa. S3 .....6.725
S.Chicago,Ill. U5, W14..6.725
SparrowsPoint,Md. B2..6.725
Warren,O. R2 .....6.725
Youngstown U5, Y1 ...6.725

PLATES, Alloy

Bridgeport,Conn. N19 ...6.55
Claymont,Del. C22 .....6.30
Coatesville,Pa. L7 .....6.30
Fontana,Calif. K1 .....7.00
Gary,Ind. U5 .....6.30
Houston S5 .....6.40
Ind.Harbor,Ind. Y1 ....6.30
Johnstown,Pa. B2 .....6.30
Munhall,Pa. U5 .....6.30
Newport,Ky. N9 .....6.30
Seattle B3 .....7.20
Sharon,Pa. S3 .....6.30
S.Chicago,Ill. U5, W14..6.30
SparrowsPoint,Md. B2 ..6.30
Youngstown Y1 .....6.30

FLOOR PLATES

Cleveland J5 .....5.575
Conshohocken,Pa. A3 ..5.575
Harrisburg,Pa. P4 ....5.575
Ind.Harbor,Ind. I-2 ...5.575
Munhall,Pa. U5 .....5.575
S.Chicago,Ill. U5 .....5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10...4.75
Ashland l.c.l. (15) A10..5.25
Cleveland c.l. R2 .....5.10
Warren,O. c.l. R2 .....5.10

BARS

(Commerical Quality)

BARS, Hot-Rolled Carbon

Ala.City,Ala. (9) R2 ....4.65
Aliquippa,Pa.(9) J5 ....4.65
Alton,Ill. L1 .....4.85
Atlanta A11 .....4.85
Bessemer,Ala.(9) T2 ...4.65
Birmingham C15 .....5.15
Bridgeport,Conn. N19 ..4.80
Buffalo(9) R2 .....4.65
Canton,O.(9) R2 .....4.75
Clairton,Pa.(9) U5 .....4.65
Cleveland(9) R2 .....4.65
Ecorse,Mich.(9) G5 .....4.75
Emeryville,Calif. J7 ...5.40
Fairfield,Ala.(9) T2 ....4.65
Fairless,Pa.(9) U5 .....4.80
Fontana,Calif. K1 .....5.35
Gary,Ind.(9) U5 .....4.65
Houston(9) S5 .....4.90
Ind.Harbor,Ind.(9) I-2..4.65
Ind.Harbor,Ind. Y1 .....4.65
Johnstown,Pa. (9) B2 ..4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo.(9) S5 ..4.90
Lackawanna (9) B2 .....4.65
LosAngeles (9) B3 .....5.35
Massillon,O.(9) R2 .....4.75
Midland,Pa. (9) C18 ....4.65
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
N.T'wanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11..5.35
Pittsburgh(9) J5 .....4.65
Portland,Oreg. O4 .....5.40
Seattle B3, N14 .....5.40
S.Chicago W14 .....4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5...4.65
S.SanFran.,Calif.(9) B3 5.40
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif.(9) C11 ..5.35
Warren,O.(9) R2 .....4.65
Weirton,W.Va.(9) W6 ...4.65
Youngstown(9) R2 U5...4.65

BARS, H.R. Leaded Alloy

Warren,O. C17 .....6.575

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....5.575
Bridgeport,Conn. N19..5.725
Buffalo R2 .....5.575
Canton,O. R2, T7 .....5.575
Clairton,Pa. U5 .....5.575
Detroit R7 .....5.575
Ecorse,Mich. G5 .....5.675
Fairless,Pa. U5 .....5.725
Fontana,Calif. K1 .....6.625
Gary,Ind. U5 .....5.575
Houston S5 .....5.825
Ind.Harbor,Ind. I-2, Y1..5.575
Johnstown,Pa. B2 .....5.575
KansasCity,Mo. S5 .....5.825
Lackawanna,N.Y. B2 ..5.575
LosAngeles B3 .....6.625
Massillon,O. R2 .....5.575
Midland,Pa. C18 .....5.575
S.Chicago R2, U5, W14..5.575
S.Duquesne,Pa. U5 .....5.575
Struthers,O. Y1 .....5.575
Warren,O. C17 .....5.575
Youngstown U5 .....5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.80
Bessemer,Ala. T2 .....6.80
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.80
Cleveland R2 .....6.80
Ecorse,Mich. G5 .....6.90
Fairfield,Ala. T2 .....6.80
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
Ind.Harb.,Ind. I-2, Y1..6.80
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....7.05
Lackawanna,N.Y. B2 ...6.80
LosAngeles B3 .....7.50
Pittsburgh J5 .....6.80
Seattle B3 .....7.55
S.Chicago W14 .....6.80
S.Duquesne,Pa. U5 .....6.80
S.SanFrancisco B3 .....7.55
Struthers,O. Y1 .....6.80
Warren,O. R2 .....6.80
Youngstown U5 .....6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..4.80
Lackawanna (9) B2 ..4.65

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....4.65
Atlanta A11 .....4.85
Fontana,Calif. K1 .....5.35
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SanFrancisco S7 .....5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....5.65
Gary,Ind. U5 .....5.65
Houston S5 .....5.90
KansasCity,Mo. S5 .....5.90
Youngstown U5 .....5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 ....8.325
Camden,N.J. P13 .....8.35
Chicago W18 .....8.325
Cleveland C20 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
SpringCity,Pa. K3 .....8.30
Warren,O. C17 .....8.575

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....6.25
BeaverFalls,Pa. M12,R2 6.25
Buffalo B5 .....6.30
Camden,N.J. P13 .....6.70
Carnegie,Pa. C12 .....6.25
Chicago W18 .....6.25
Cleveland A7, C20 .....6.25
Detroit B5, P17 .....6.45
Detroit R7 .....6.25
Donora,Pa. A7 .....6.25
Elyria,O. W8 .....6.25
FranklinPark,Ill. N5 ...6.25
Gary,Ind. R2 .....6.25
GreenBay,Wis. F7 .....6.25
Hammond,Ind. L2, M13..6.25
Hartford,Conn. R2 .....6.75
Harvey,Ill. B5 .....6.25
LosAngeles(49) S30 ....7.70
LosAngeles R2 .....7.70
Mansfield,Mass. B5 ....6.80
Massillon,O. R2, R8 ...6.25
Midland,Pa. C18 .....6.25
Monaca,Pa. S17 .....6.25
Newark,N.J. W18 .....6.70
NewCastle,Pa.(17) B4..6.25
Pittsburgh J5 .....6.25
Plymouth,Mich. P5 .....6.50
Putnam,Conn. W18 .....6.80
Readville,Mass. C14 ...6.80
S.Chicago,Ill. W14 .....6.25
SpringCity,Pa. W3 .....6.70
Struthers,O. Y1 .....6.25
Waukegan,Ill. A7 .....6.25
Worcester,Mass. W19 ...6.70
Youngstown F3, Y1 .....6.25

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19..5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 .....7.425
Buffalo B5 .....7.425
Camden,N.J. P13 .....7.60
Canton,O. T7 .....7.425
Carnegie,Pa. C12 .....7.425
Chicago W18 .....7.425
Cleveland A7, C20 .....7.425
Detroit R7 .....7.425
Detroit B5, P17 .....7.625
Donora,Pa. A7 .....7.425
Elyria,O. W8 .....7.425
Gary,Ind. R2 .....7.425
GreenBay,Wis. F7 .....7.425
Hammond,Ind. L2, M13..7.425
Hartford,Conn. R2 .....7.725
Harvey,Ill. B5 .....7.425
Lackawanna,N.Y. B2 ..7.425
LosAngeles S30 .....9.10
Mansfield,Mass. B5 ....7.725
Massillon,O. R2, R8 ...7.425
Midland,Pa. C18 .....7.425
Monaca,Pa. S17 .....7.425
Newark,N.J. W18 .....7.60
Plymouth,Mich. P5 .....7.625
S.Chicago W14 .....7.425
SpringCity,Pa. K3 .....7.60
Struthers,O. Y1 .....7.425
Warren,O. C17 .....7.425
Waukegan,Ill. A7 .....7.425
Worcester,Mass. A7 ....7.725
Youngstown F3, Y1 ...7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....4.65
Atlanta A11 .....4.85
Birmingham C15 .....5.15
Buffalo R2 .....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.75
Emeryville,Calif. J7 ...5.40
Fairfield,Ala. T2 .....4.65
Fairless,Pa. U5 .....4.80
Fontana,Calif. K1 .....5.35
Ft.Worth,Tex.(42) T4 ..5.10
Gary,Ind. U5 .....4.65
Houston S5 .....4.90

Ind.Harbor,Ind. I-2, Y1.4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity, Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 ....5.40
SandSprings,Okla. S5 ...5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne,Pa. U5 ....4.65
S.SanFrancisco B3 ....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5.....4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2.6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ...6.17
Marion,O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ½-1" B2...6.15
Williamsport,Pa. S19 ...6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..4.65
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex(26) T4...5.10
Franklin,Pa.(3) F5 ....4.65
Franklin,Pa.(4) F5 ....4.65
JerseyShore,Pa.(4) J8 ...4.65
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.80
Tonawanda(3) B12 ....4.65
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19.4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14. 14.65
McK.Rks. (S.R.) L5 ..11.50
McK.Rks.(D.R.) L5 ..16.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit(8) M1 .....4.425
Dravosburg,Pa. U5 ....4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fairless,Pa. U5 .....4.375
Fontana,Calif. K1 .....5.125
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2, Y1 4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ....4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint, Md. B2.4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 ....5.625
Niles,O. M21 .....5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1 .....7.20

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ...6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
Fairless,Pa. U5 .....6.425
Fontana,Calif. K1 .....7.175
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1.6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago,Ill. U5 ....6.375
SparrowsPoint(36) B2.6.375
Warren,O. R2 .....6.375
Weirton,W.Va. W6 ....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2 ...4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 ....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
Fairless,Pa. U5 .....5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 .....6.525
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1.5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport, Ky. N9 .....5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown U5, Y1 .....5.325

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 ....7.875
Dravosburg,Pa. U5 ...7.875
Ecorse,Mich. G5 .....7.975
Fairless,Pa. U5 .....7.925
Fontana,Calif. K1 .....9.075
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky.	A10.6.90	...
Canton,O.	R2 ....6.10	6.55
Dravosburg	U5 ..6.10	...
Fairfield	T2 ....6.10	...
Gary,Ind.	U5 ....6.10	6.35
Ind.Harbor	I-2 ..6.10	6.35
Kokomo,Ind.	C16.6.20	...
MartinsFry.	W10.6.10	...
Newport,Ky.	N9..6.10	6.35
Pitts.,Calif.	C11..6.85	...
SparrowsPt.	B2..6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 .....7.15
Gary,Ind. U5 .....6.35
MartinsFry,O. W10 ....6.35

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85‡
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85‡
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ...5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.55*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.55‡
Pittsburg,Calif. C11 ...6.60*
SparrowsPt.,Md. B2 ..5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ...5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ..... 6.625

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2..8.60

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .8.50
Butler,Pa. A10 (type 2) .8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 ....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.65

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft.HowardSteel&Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel&Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Suppy
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md.Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter, Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..4.325
Allenport,Pa. P7 .....4.325
Alton,Ill. L1 .....4.50
Ashland,Ky.(8) A10 ..4.325
Atlanta A11 .....4.525
Bessemer,Ala. T2 .....4.325
Birmingham C15 .....4.825
Bridgeport,Conn. N19 ..4.625
Buffalo(27) R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit M1 .....4.425
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fontana,Calif. K1 .....5.125
Gary,Ind. U5 .....4.325
Ind.Harbor,Ind. I-2,Y1.4.325
Johnstown,Pa.(25) B2..4.325
Lackaw'na,N.Y.(24) B2 4.325
LosAngeles(25) B3 ....5.075
Milton,Pa. M18 .....4.325
Minnequa,Colo. C10 ...5.425
Pittsburg,Calif. C11 ...5.075
Riverdale,Ill. A1 .....4.55
SanFrancisco S7 .....5.05
Seattle(25) B3 .....5.325
Seattle N14 .....5.40
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
S.SanFrancisco(25) B3.5.075
SparrowsPoint,Md. B2..4.325
Sterling(1) N15 .....4.325
Sterling,Ill. N15 .....4.425
Torrance,Calif. C11 ...5.075
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5 .....4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.20
Fontana,Calif. K1 .....8.95
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
LosAngeles B3 .....8.40
Newport,Ky. N9 .....7.20
Sharon,Pa. S3 .....7.20
S.Chicago W14 .....7.20
Youngstown U5, Y1 ....7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....6.425
Conshohocken,Pa. A3 ..6.425
Ecorse,Mich. G5 .....6.525
Fairfield,Ala. T2 .....6.425
Fontana,Calif. K1 .....7.575
Gary,Ind. U5 .....6.425
Houston S5 .....6.675
Ind.Harbor,Ind. I-2, Y1.6.425
KansasCity,Mo. S5 ....6.675
Lackawanna,N.Y. B2 ..6.425
LosAngeles(25) B3 ....7.175
Seattle(25) B3 .....7.425
Sharon,Pa. S3 .....6.425
S.SanFrancisco(25) B3.7.175
SparrowsPoint,Md. B2..6.425
Warren,O. R2 .....6.425
Weirton,W.Va. W6 .....6.425
Youngstown U5, Y1 ...6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....6.25
Baltimore T6 .....6.25
Boston T6 .....6.80
Buffalo S40 .....6.25
Cleveland A7, J5 .....6.25
Conshohocken,Pa. A3 ..6.30
Dearborn,Mich. D3 .....6.35
Detroit D2, M1, P20....6.35
Dover,O. G6 .....6.25
Ecorse,Mich. G5 .....6.35
Follansbee,W.Va. F4 ...6.25
Fontana,Calif. K1 .....8.00
FranklinPark,Ill. T6 ...6.35
Ind.Harbor,Ind. I-2 ....6.35
Ind.Harbor,Ind. Y1 ....6.25
Indianapolis C8 .....6.40
Lackawanna,N.Y. B2 ...6.25
LosAngeles C1 .....8.30
NewBedford,Mass. R10..6.70
NewBritain(10) S15 ....6.25
NewCastle,Pa. B4, E5..6.25
NewHaven,Conn. A7, D2 6.70
NewKensington,Pa. A6..6.25
Pawtucket, R.I. R3 ....6.90
Pawtucket,R.I. N8 .....6.80
Pittsburgh J5 .....6.25
Riverdale,Ill. A1 .....6.35
Rome,N.Y.(32) R6 ....6.25
Sharon,Pa. S3 .....6.25
SparrowsPt.,Md. B2 ....6.25
Trenton,N.J.(31) R5 ...7.80
Wallingford,Conn. W2 ..6.70
Warren,O. R2, T5 .....6.25
Weirton,W.Va. W6 .....6.25
Worcester,Mass. A7 ....6.80
Youngstown C8, Y1 ....6.25

STRIP, Cold-Rolled Alloy

Boston T6 .....13.80
Carnegie,Pa. S18 .....13.45
Cleveland A7 .....13.45
Dover,O. G6 .....13.45
FranklinPark,Ill. T6 ..13.45
Harrison,N.J. C18 .....13.45
Indianapolis C8 .....13.60
Pawtucket,R.I. N8 ....13.80
Sharon,Pa. S3 .....13.45
Worcester,Mass. A7 ...13.75
Youngstown C8 .....13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7 .....9.10
Dearborn,Mich. D3 ....9.20
Dover,O. G6 .....9.30
Ecorse,Mich. G5 .....9.20
Ind.Harbor,Ind. Y1 ....9.30

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.90	13.05	15.75
Carnegie,Pa. S18	...	9.05	10.60	12.75	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	....	....
Detroit D2	7.20	9.15	10.70	12.85	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15.	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	....
NewKensington,Pa. A6	7.10	9.05	10.60	....	....
NewYork W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.80	18.15	....
Buffalo W12	...	...	14.80	....	....
FranklinPark,Ill. T6	...	...	*15.15*	*18.50*	*22.35*
Harrison,N.J. C18	...	...	14.80	18.15	22.00
NewYork W3	...	...	14.80	18.15	22.00
Trenton,N.J. R5	...	...	14.80	18.15	22.00
Worcester,Mass. W12	...	...	14.80	....	....
Worcester,Mass. A7, T6	...	...	14.80	18.15	22.00
Youngstown C8	...	...	*15.15*	*18.50*	*22.35*

STRIP, Electrogalvanized

Cleveland A7 .....6.25*
Dover,O. G6 .....6.25*
Riverdale,Ill. A1 .....6.35*
Youngstown C8 .....6.25*
Warren,O. T5 .....6.25*
Warren,O. B9 .....6.45*
Weirton,W.Va. W6 ....5.75*
Worcester,Mass. A7 ...6.80*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.55

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.05
Riverdale,Ill. A1 .....4.90
Sharon,Pa. S3 .....4.75
Youngstown U5 .....4.75

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10 ..	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	....	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2 ..	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4..	....	15.85	17.45	17.95	18.45	13.55**
Butler,Pa. A10	....	....	17.45	17.95	....	....
Vandergrift,Pa. U5 ..	14.85	15.85	17.45	17.95	....	13.55
Warren,O. R2	....	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
Fairless,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa.U5	9.20	9.45
Fairfield,Ala. T2.	9.30	9.55
Fairless,Pa. U5 ..	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1.	9.20	9.45
Pitts.,Calif. C11..	9.95	10.20
Sp.Pt.,Md. B2 ...	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10.	9.20	9.45

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$7.00
Dravosburg,Pa. U5	7.00
Fairfield,Ala. T2	7.10
Fairless,Pa. U5	7.10
Gary,Ind. U5	7.00
GraniteCity,Ill. G4	7.10
Ind.Harbor,Ind. I-2, Y1.	7.00
Niles,O. R2	7.00
Pittsburg,Calif. C11	7.75
SparrowsPoint,Md. B2 ..	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5 ....6.65
Gary,Ind. U5 .....6.65
GraniteCity,Ill. G4 .....6.75
Ind.Harbor,Ind. Y1 ....6.65
Yorkville,O. W10 .....6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5 ....$8.70
Gary,Ind. U5 .....8.70
Yorkville,O. W10 .....8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10 .....$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5 .....$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..6.60
Aliquippa,Pa. J5 .....6.60
Alton,Ill. L1 .....6.775
Atlanta A11 .....6.80
Bartonville,Ill. K4 .....6.35
Buffalo W12 .....6.60
Chicago W13 .....6.60
Cleveland A7 .....6.60
Crawfordsville,Ind. M8..6.70
Donora,Pa. A7 .....6.60
Duluth,Minn. A7 .....6.60
Fairfield,Ala. T2 .....6.60
Fostoria,O.(24) S1 .....6.80
Houston S5 .....6.85
Jacksonville,Fla. M8 ...6.95
Johnstown,Pa. B2 .....6.60
Joliet,Ill. A7 .....6.60
KansasCity,Mo. S5 ....6.85
Kokomo,Ind. C16 .....6.70
LosAngeles B3 .....7.55
Minnequa,Colo. C10 ....6.85
Monessen,Pa. P7 .....6.60
Newark 6-8 ga. I-1 ....6.90
N.Tonawanda B11 .....6.60
Palmer,Mass. W12 .....6.90
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.60
Rankin,Pa. A7 .....6.60
S.Chicago,Ill. R2 .....6.60
S.SanFrancisco C10 ....7.55
SparrowsPoint,Md. B2 ..6.70
Sterling,Ill.(1) N15 ....6.60
Sterling,Ill. N15 .....6.70
Struthers,O. Y1 .....6.60
Waukegan,Ill. A7 .....6.60
Worcester,Mass. A7 ....6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....7.90
Alton,Ill. L1 .....8.075
Bartonville,Ill. K4 .....8.90
Buffalo W12 .....7.90
Cleveland A7 .....7.90
Donora,Pa. A7 .....7.90
Duluth,Minn. A7 .....7.90
Fostoria,O. S1 .....7.90
Johnstown,Pa. B2 .....7.90
LosAngeles B3 .....8.85
Milbury,Mass.(12) N6 ..8.20
Minnequa,Colo. C10 ....8.15
Monessen,Pa. P16 .....7.90
Muncie,Ind. I-7 .....8.10
Palmer,Mass. W12 .....8.20
Pittsburg,Calif. C11 ....8.85
Portsmouth,O. P12 .....7.90
Roebling,N.J. R5 .....8.20
S.Chicago,Ill. R2 .....7.90
S.SanFrancisco C10 ....8.85
SparrowsPt.,Md. B2 ...8.00
Struthers,O. Y1 .....7.90
Trenton,N.J. A7 .....8.20
Waukegan,Ill. A7 .....7.90
Worcester A7,J4,T6,W12..8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....7.60
Alton,Ill. L1 .....7.775
Buffalo W12 .....7.60
Cleveland A7 .....7.60
Donora,Pa. A7 .....7.60
Duluth,Minn. A7 .....7.60
Johnstown,Pa. B2 .....7.60
KansasCity,Mo. S5 ....7.85
LosAngeles B3 .....8.55
Minnequa,Colo. C10 ...7.775
Monessen,Pa. P16 .....7.60
NewHaven,Conn. A7 ....7.90
Palmer,Mass. W12 .....7.90
Pittsburg,Calif. C11 ....8.55
Portsmouth,O. P12 .....7.60
Roebling,N.J. R5 .....7.90
S.Chicago,Ill. R2 .....7.60
S.SanFrancisco C10 ....8.55
SparrowsPoint,Md. B2 ..7.70
Struthers,O. Y1 .....7.60
Trenton,N.J. A7 .....7.90
Waukegan,Ill. A7 .....7.60
Worcester,Mass. A7 ....7.90

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....12.725
Bartonville,Ill. K4 ....12.65
Buffalo W12 .....12.55
Chicago W13 .....12.55
Cleveland A7 .....12.55
Crawfordsville,Ind. M8.12.65
Fostoria,O. S1 .....12.55
Jacksonville,Fla. M8 ..12.90
Johnstown,Pa. B2 ....12.55
Kokomo,Ind. C16 .....12.55
Minnequa,Colo. C10 ...12.30
Monessen,Pa. P6 .....12.55
Muncie,Ind. I-7 .....12.75
Palmer,Mass. W12 .....12.85
Roebling,N.J. R5 .....12.85
S.SanFrancisco C10 ....12.90
Waukegan,Ill. A7 .....12.55
Worcester,Mass. A7,T6.12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4 ....10.70
Buffalo W12 .....10.70
Johnstown,Pa. B2 .....10.70
Minnequa,Colo. C10 ..10.825
Monessen,Pa. P16 .....10.70
Muncie,Ind. I-7 .....10.90
Pittsburg,Calif. C11 ...11.50
Portsmouth,O. P12 .....10.70
Roebling,N.J. R5 .....11.00
SparrowsPt.,Md. B2 ....10.80
Struthers,O. Y1 .....10.70

ROPE WIRE (A)

Bartonville,Ill. K4 .....10.55
Buffalo W12 .....10.55
Fostoria,O. S1 .....10.55
Johnstown,Pa. B2 .....10.55
Monessen,Pa. P16 .....10.55
Muncie,Ind. I-7 .....10.75
Palmer,Mass. W12 .....10.85
Portsmouth,O. P12 .....10.55
Roebling,N.J. R5 .....10.85
SparrowsPt. B2 .....10.65
Struthers,O. Y1 .....10.55
Worcester,Mass. J4 ....10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead
Bartonville,Ill. K4 ....14.15
Monessen,Pa. P16 ....14.20
Roebling,N.J. R5 ....14.35

WIRE, Cold-Rolled Flat
Anderson,Ind. G6 .....9.00
Baltimore T6 .....9.80
Boston T6 .....9.80
Buffalo W12 .....9.00
Cleveland A7 .....9.50
Crawfordsville,Ind. MS..9.00
Dover,O. G6 .....9.00
Fostoria,O. S1 .....9.00
FranklinPark,Ill. T6 ...9.60
Kokomo,Ind. C16 .....9.00
Massillon,O. R8 .....9.00
Milwaukee C23 .....9.20
Monessen,Pa. P16 .....9.00
Pawtucket,R.I. N8 .....9.80
Riverdale,Ill. A1 .....9.10
Rome,N.Y. R6 .....9.00
Trenton,N.J. R5 .....9.80
Worcester A7, T6, W12. 9.80

NAIL, Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala.(44) R2.152
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Chicago,Ill. W13 152
Cleveland A9 157
Crawfordsville,Ind. MS ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Galveston,Tex. D7 157
Houston,Tex. S5 157
Jack'ville,Fla.(23) MS...162
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
KansasCity,Mo. S5 157
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill.(44) R2 ...152
SparrowsPt.,Md. B2 154
Sterling,Ill.(1) N15 152
Worcester,Mass. A7 158

NAILS, CUT (100 lb keg)
To Dealers (33)
Conshohocken,Pa. A3..$9.05
Wheeling,W.Va. W10 ...9.05

STAPLES, Polished Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala.(44) R2.152
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Crawfordsville,Ind. MS ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Jack'ville,Fla.(23) MS ...162
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill.(44) R2 ...152
SparrowsPt.,Md. B2 154
Sterling,Ill.(1) N15 152
Worcester,Mass. A7 158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)
Coil No. 3150
AlabamaCity,Ala. R2 ..$9.45
Bartonville,Ill. K4 .....9.45
Buffalo W12 .....9.35
Crawfordsville,Ind. MS..9.45
Donora,Pa. A7 .....9.35
Duluth,Minn. A7 .....9.35
Jacksonville,Fla. MS 9.88
Johnstown,Pa. B2 .....9.35
Joliet,Ill. A7 .....9.35
Kokomo,Ind. C16 .....9.45
LosAngeles B3 .....10.14
Minnequa,Colo. C10 ....9.60
Pittsburg,Calif. C11 ....10.13
S.Chicago,Ill. R2 .....9.45
SparrowsPt.,Md. B2 .....9.45
Sterling,Ill. N15 .....9.35

Coil No. 6500 Stand.
AlabamaCity,Ala. R2 ..$9.75
Bartonville,Ill. K4 .....9.75
Buffalo W12 .....9.65
Crawfordsville,Ind. MS..9.75
Donora,Pa. A7 .....9.65
Duluth,Minn. A7 .....9.65
Jacksonville,Fla. MS ...10.18
Johnstown,Pa. B3 .....9.65
Joliet,Ill. A7 .....9.65
Kokomo,Ind. C16 .....9.75
LosAngeles B3 .....10.45
Minnequa,Colo. C10 ...9.90
Pittsburg,Calif. C11 ...10.45
S.Chicago,Ill. R2 .....9.75
SparrowsPt.,Md. B2 ....9.75
Sterling,Ill. N15 .....9.65

Coil No. 6500 Interim
AlabamaCity,Ala. R2 ..$9.80
Bartonville,Ill. K4 .....9.80
Buffalo W12 .....9.70
Crawfordsville,Ind. MS..9.80
Donora,Pa. A7 .....9.70
Duluth,Minn. A7 .....9.70
Jacksonville,Fla. MS ...10.23
Johnstown,Pa. B2 .....9.70
Joliet,Ill. A7 .....9.70
Kokomo,Ind. C16 .....9.80
LosAngeles B3 .....10.50
Minnequa,Colo. C10 ....9.95
Pittsburg,Calif. C11 ..10.50
S.Chicago,Ill. R2 .....9.80
SparrowsPt.,Md. B2 ....9.80
Sterling,Ill. N15 .....9.70

WIRE, Barbed **Col.**
AlabamaCity,Ala. R2..175**
Aliquippa,Pa. J5 .....172‡
Atlanta A11 181
Bartonville,Ill. K4 181
Crawfordsville,Ind. MS ..181
Donora,Pa. A7 .....175†
Duluth,Minn. A7 .....175†
Fairfield,Ala. T2 .....175†
Houston,Tex. S5 .....180**
Jacksonville,Fla. MS 186
Johnstown,Pa. B2 .....179*
Joliet,Ill. A7 .....175†
KansasCity,Mo. S5 ....180**
Kokomo,Ind. C16 .....177†
Minnequa,Colo. C10 ...180**
Monessen,Pa. P7 .....178††
Pittsburg,Calif. C11 ....195†
Rankin,Pa. A7 .....175†
S.Chicago,Ill. R2 .....175**
S.SanFrancisco C10 ...195**
SparrowsPoint,Md. B2 ..181*
Sterling,Ill.(1) N15 ...179††

WOVEN FENCE, 9-15 ga. **Col.**
Ala.City,Ala. R2 .....162**
Ala.City, 17 ga. R2....257**
Aliq'ppa,Pa.9-14½ga J5 165‡
Atlanta A11 168
Bartonville,Ill. K4 168
Crawfordsville,Ind. MS ..168
Donora,Pa. A7 .....162†
Duluth,Minn. A7 .....162†
Fairfield,Ala. T2 .....162†
Houston,Tex. S5 .....167**
Jacksonville,Fla. MS 173
Johnstown,Pa.(43) B2 166
Joliet,Ill. A7 .....162†
KansasCity,Mo. S5 ....167**
Kokomo,Ind. C16 .....164†
Minnequa,Colo. C10 ...167**
Monessen,Pa. 9 ga. P17 166††
Pittsburg,Calif. C11 ...185†
Rankin,Pa. A7 .....162†
S.Chicago,Ill. R2 .....162**
Sterling,Ill.(1) N15 ...166††

WIRE (16 Gage)	An'ld Galv. Stone	Stone
Ala.City R2	...14.50	16.05**
Bartonville K4	...14.50	16.55
Buffalo W12	....14.50	....
Cleveland A7	....14.50	....
Crawf'dsville MS	14.60	16.55
Fostoria,O. S1	..14.60	16.15†
Jacksonville MS	..14.85	16.80
Johnstown B2	..14.50	16.40*
Kokomo C16	...14.60	16.15†
Minnequa C10	..14.75	16.45**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	..14.50	16.05**
SparrowsPt. B2	..14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	..14.50	16.05†
Worcester A7	...14.80	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	..7.50 7.90**
Aliquippa J5	....7.40 7.925‡
Atlanta A11	.....7.50 8.10
Bartonville(48) K4	7.50 8.10
Buffalo W12	....7.40 8.80†
Cleveland A7	....7.40 ....
Crawfordsville MS	7.50 8.10
Donora,Pa. A7	...7.40 7.80†
Duluth,Minn. A7	..7.40 7.80†
Fairfield T2	.....7.40 7.80†
Houston(48) S5	..7.65 8.05**
Jacks'ville,Fla. MS	7.75 8.35
Johnstown B2(48)	7.40 7.975*
Joliet,Ill. A7	.....7.40 7.80†
Kans.City(48) S5	7.65 8.05**
Kokomo C16	....7.50 7.90†
LosAngeles B3	...8.35 8.925*
Minnequa C10	...7.65 8.05**
Monessen P7(48)	7.40 8.00††
Palmer,Mass. W12	7.70 8.10†
Pitts.,Calif. C11	..8.35 8.75†
Portsmouth,O. P12	7.40 ....
Rankin A7	.....7.40 7.80†
S.Chicago R2	...7.50 7.90**
S.SanFran. C10	...8.35 8.75**
Spar'wsPt.B2(48)	7.50 8.075*
Str'ling(1)(48)N15	7.40 8.00††
Struthers,O.(48)Y1	7.40 7.90‡
Worcester,Mass.A7	7.70 ....

Based on zinc price of: *12.50c. †5c. §10c. ‡Less than 10c. ††13c. **Subject to zinc equalization extras.

FASTENERS
(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts
Full-Size Body (cut thread)
†½" x 6" and smaller 61
Larger than ½" diam. and all diams. longer than 6" 55
Under-Size Body (rolled thread; not nutted):
½" x 6" and smaller. 61

†½" x 4" and smaller and shorter are not nutted.

NUTS
Reg. & Heavy Square Nuts, all sizes 61
H. P. Reg. & Heavy Hex Nuts:
⅝" & smaller 64
⅞" to 1⅛" incl. 63
1¼" to 1½" incl. 65
1⅝" & larger 61
C.P. Reg. & Heavy Hex Nuts
⅜" & smaller 64
⅞" & larger 61
Semifinished & Finished Nuts
⅜" & smaller 66
⅞" & larger 63
Semifinished Slotted Reg. & Heavy Hex Nuts
¾" & smaller 66
⅞" & larger 63
Hot Galvanized Nuts, all types
1½" & smaller 44
(On above items, add 25% for less than case quantities)

CAP SCREWS
(New Std., hexagon head, upset, packages)
Bright:
6" and shorter:
¼" through ½" diam. 34
⅝" & ¾" diam. 31
⅞", ⅞", 1" 8
Longer than 6":
¼" through ⅝" diam. 3
¾" through 1" diam. +13
High Carbon, Heat-treated:
6" and shorter:
¼" through ½" diam. 20
⅝" & ¾" diam. 16
⅞", ⅞", 1" .....+11
Longer than 6":
¼" through ⅝" diam. +23
¾" through 1" diam. +41
(New Std. Hexagon head, upset, bulk)
Bright:
½" x 6" & smaller & shorter 49
⅝" & ¾" diam. x 6" & shorter 48
⅞", ⅞", 1" x 6" & shorter 31
High Carbon, Heat-treated:
½" x 6" & smaller & shorter 41
⅝" x ¾" diam. & 6" & shorter 39
⅞", ⅞", 1" x 6" & shorter 20

MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)
No. 2 to ¾" incl., Square:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
No. 2 to ⅜" incl., Hex.:
25,000 to 199,999 pieces 18
200,000 or more pieces 25

MACHINE SCREWS, SLOTTED (Bulk)
No. 2 to ¼" diam. incl.:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
⅝" to ½" diam. incl.:
15,000 to 99,999 pieces 20
100,000 or more 27

BOILER TUBES
Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2¾	12	41.57	49.16	40.31
2¾	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	...(16)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES
Fairfield,Ala. T2 .....5.625
Gary,Ind. U5 .....5.625
Ind.Harbor,Ind. I-2 ...5.625
Lackawanna,N.Y. B2..5.625
Minnequa,Colo. C10 ...5.625
Seattle B3 .....5.775
Steelton,Pa. B2 .....5.625
Torrance,Calif. C11 ...5.775

TRACK BOLTS, Untreated
Cleveland R2 .....12.15
KansasCity,Mo. S5....12.90*
Lebanon,Pa. B2 .....12.15
Minnequa,Colo. C10 ...12.15
Pittsburgh O3, P14 ...12.15
Seattle B3 .....12.65

*Treated

AXLES
Ind.Harbor,Ind. S13 ...7.50
Johnstown,Pa. B2 .....7.50

JOINT BARS
Bessemer,Pa. U5 .....5.825
Fairfield,Ala. T2 .....5.825
Ind.Harbor,Ind. I-2 ...5.825
Joliet,Ill. U5 .....5.825
Lackawanna,N.Y. B2 ..5.825
Minnequa,Colo. C10 ...5.825
Steelton,Pa. B2 .....5.825

SCREW SPIKES
Cleveland R2 .....11.90
Pittsburgh O3 .....11.90

STANDARD TRACK SPIKES
Fairfield,Ala. T2 .....7.90
Ind.Harbor,Ind. I-2, Y1.7.90
KansasCity,Mo. S5 ....7.90
Lebanon,Pa. B2 .....7.90
Minnequa,Colo. C10 ....7.90
Pittsburgh J5 .....7.90
Seattle B3 .....8.40
S.Chicago,Ill. R2 .....7.90
Struthers,O. Y1 .....7.90
Youngstown R2 .....7.90

METAL POWDER
(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge iron: 98+% Fe, annealed.	9.25
Swedish, c.l.f., Camden, N. J., c.l. in bags..	9.50
Domestic, f.o.b., Johnstown, Pa., Riverton, N.J., Niagara Falls, N.Y., in bags	9.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)..	31.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb. containers; all minus 200 mesh.	
Aluminum: Atomized, 500 lb, drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	39.75-55.00†
Bronze, 5000-lb lots	66.50-70.75†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed ...	$1.00
Nickel-Silver, 5000-lb lots .....61.75-64.25†	
Phosphor-Copper, 5000-lb lots	68.75
Silicon	47.50
Solder	7.00*
Stainless Steel, 302 ..	99.00
Stainless Steel, 316 ..	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.25-33.00‡
Tungsten Dollars	
Melting grade, 99%	
60 to 200 mesh:	
1000 lb and over...	4.50
Less than 1000 lb..	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Plus 4c per 100 lb.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(44) Plus 3c per 100 lb.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 7.95c over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	...	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless, Pa. N3	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	...	...	....	....	....	....	*6*	*+13.25*	*9*	*+9.25*	*11.5*	*+5.75*	*14*	*+4*
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	...	....	...
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	*14.5*	*+3*	*15*	*+2.5*	*16.5*	*+1.75*	*16.5*	*+1.75*	*7*	*+11.75*	*7*	*+11.75*
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	75.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CeTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Tool Steel

	Plates Carbon Base 10%	Plates Carbon Base 20%	Sheets Carbon Base 20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base Cold Rolled 10%	Strip, Carbon Base Cold Rolled Both Sides
Copper*	32.75	41.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Clad Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9 C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
AlabamaCity,Ala. R2	54.50	....	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda,N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.80	61.30	61.30	61.80
Muskegon,Mich. deld.	....	65.68	65.68	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	*65.01*	*65.51*	....
Newark, deld.	*63.70*	*64.20*	*64.70*	*65.20*
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	*62.26*	*62.76*	*63.26*	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	*62.26*	*62.76*	*63.26*	*63.76*
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5.	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	*66.00*	*66.50*	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry, 12½ lb pigiets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

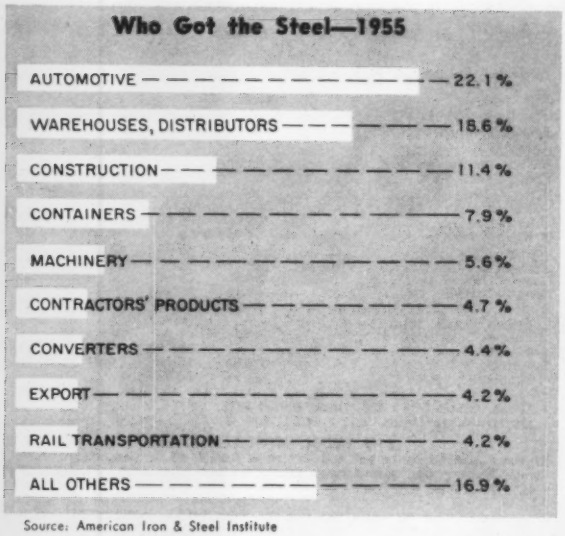
Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Mer-chant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.42	...	9.39	....	7.63	7.49	9.48
Baltimore	7.21	8.32	8.50	....	7.91	7.53	..	8.62[3]	13.49	7.93	7.21	8.98
Birmingham	7.00	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.14	9.34
Boston	7.88	8.81	10.27	53.32	7.96	7.87	8.49	9.67	13.50	8.13	8.20	9.47
Buffalo	7.20	8.25	10.01	....	7.35	7.35	8.05	7.90	13.35	7.60	7.65	9.00
Chattanooga	7.28	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.43	7.45	9.32
Chicago	7.13	8.24	9.10	46.75	7.21	7.27	7.80	7.75	13.05	7.43	7.45	8.72
Cincinnati	7.25	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.29	7.90	7.74	8.97
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.11	7.76	7.62	8.89
Detroit	7.32	8.43	9.38	43.50	7.49	7.55	8.08	8.04	13.25	7.90	7.73	8.91
Erie, Pa.	7.08	8.24	8.95[10]	....	7.31	7.35	...	8.10[10]	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	...	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.44	8.50	9.20	....	7.42	7.57	8.10	9.44	....	7.73	7.75	9.39
Los Angeles	8.15	10.00	11.00	51.50	8.50	8.15	8.70	10.90	14.35	8.30	8.75	10.85
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.89	7.94	13.14	7.60	7.54	8.81
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	...	8.10	....	7.63	7.34	...
New York	7.74	8.84	9.59	47.57	8.17	8.11	8.66	9.72	13.43	8.09	8.17	9.46
Norfolk, Va.	7.25	...	...	....	7.65	7.65	...	9.50	....	7.95	7.45	8.95
Philadelphia	7.32	8.42	9.37	45.98	7.93	7.68	8.21	8.46	13.21	7.74	7.68	8.80**
Pittsburgh	7.13	8.24	9.40	49.00	7.21	7.27	7.80	8.00	13.05	7.43	7.45	8.72
Portland, Oreg.	7.80	8.80	10.65	....	8.00	7.95	...	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.25	...	9.49	....	7.85	7.85	8.38	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.69	43.89	7.50	7.56	8.09	8.29	13.34	7.83	7.74	9.01
St. Paul	7.46	8.59	9.16	....	7.72	7.74	...	8.51	13.51	7.94	7.65	9.12
San Francisco	8.20	9.65	10.15	51.65	8.35	8.15	8.70	11.45	14.35[3]	8.25	8.30	10.50
Seattle	8.65	10.40	10.80	54.00	8.90	8.60	9.15	12.10	14.65	8.40	8.40	10.65
Spokane	8.65	11.00[7]	10.80	....	8.90	8.60	9.15	12.10	15.40	8.40	8.40	11.15
Washington	7.59	8.70	7.97	....	8.12	8.08	...	9.09	....	8.51	7.91	9.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **½-in. and heavier; ††as annealed; ‡‡under ⅛-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [2]—500 to 9999 lb; [3]—400 to 999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over; [10]—2000 lb and over.



Source: American Iron & Steel Institute

Autos Take Bigger

AUTO PRODUCERS in 1955 entrenched themselves further as the No. 1 user of steel, American Iron & Steel Institute figures show (below).

Traditionally, motordom consumes about one-fifth of all steel produced. Last year, the figure soared to 22.09 per cent on the strength of the biggest year on record for passenger cars and trucks. More impressive is the increase in tonnage—from 11,792,989 tons in 1954 to 18,721,880 tons in 1955, or 58.8 per cent.

Warehouses Next—The only market classification even approaching auto's leadership, AISI figures show, is warehouses and distributors. This consistently second-largest consumer took 18.6 per cent of the output last year, off slightly from 19 per cent of a year before. But with higher over-all steel operations last year, warehouses still got 3,758,533 tons more than in 1954.

DISTRIBUTION OF FINISHED STEEL BY

Net tons of mill shipments of all grades, including alloy and stainless.

Market Classification	Ingots, Blooms, Billets, Slabs, Sheet Bars, and Seamless Tube Rounds	Skelp	Wire Rods	Structural Shapes (heavy)	Steel Piling	Plates	Standard Rails (over 60 lb)	Rails (all other)	Joint Bars	Tie Plates
Converters, Processors	461,697	109,792	477,085	1,385	.....	158,415	46	64	2,084	56
Forgings (except automotive)	735,436	.....	1,200	.....	.....	13,464	.....	.....	.....	.....
Bolts, Nuts, Rivets, Screws	34,769	.....	394,826	.....	.....	2,337	.....	.....	.....	.....
Jobbers, Dealers, Distributors	45,958	142	19,092	956,912	41,314	1,005,743	5,925	15,023	1,521	1,156
Construction, Maintenance	133,259	.....	32,968	2,589,974	308,761	1,744,611	30,403	33,724	3,830	3,495
Contractors' Products	3,526	.....	42,012	18,742	.....	190,220	.....	.....	.....	.....
Automotive	667,219	.....	47,829	44,445	.....	528,387	.....	.....	.....	.....
Rail Transportation	29,632	.....	26	335,964	87	637,926	1,068,903	10,234	56,320	296,316
Shipbuilding, Marine Equip.	6,771	.....	342	102,014	2,908	391,570	12,166	443	1	.....
Aircraft	18,473	.....	13	2,435	.....	9,874	.....	.....	.....	.....
Oil & Gas Drilling	39,405	.....	.....	49,875	3,038	38,368	.....	.....	.....	.....
Mining, Quarrying, Lumbering	3,620	.....	52	20,969	1,298	71,374	7,155	13,592	2,487	8,149
Agricultural	27,519	.....	11,466	50,598	.....	109,070	.....	.....	.....	.....
Machinery, Indust. Equip., Tools	178,314	.....	108,466	264,656	.....	1,311,427	4,312	2,807	75	37
Electrical Machinery & Equip.	25,758	.....	19,786	30,573	.....	158,443	.....	.....	.....	.....
Appliances, Utensils, Cutlery	419	.....	360	2,657	.....	9,627	.....	.....	.....	.....
Other Domestic, Commercial Equip.	333	.....	12,095	5,120	.....	20,379	.....	.....	.....	.....
Containers	15,373	.....	1,190	651	.....	50,189	.....	.....	.....	.....
Ordnance & Other Military	397,700	.....	95	7,469	95	117,874	.....	643	.....	.....
Export	577,365	81,657	34,627	252,548	33,847	189,289	22,067	1,447	1,560	2,202
Unclassified	20,561	.....	312	.....	.....	3,671	.....	4,790	436	.....
Total	3,423,107	191,591	1,203,842	4,736,987	391,348	6,762,258	1,150,977	82,767	68,314	311,411

Market Classification	Mechanical Tubing	Pressure Tubing	Wire, Drawn	Nails and Staples	Wire, Barbed and Twisted	Woven Wire Fence	Bale Ties	Black Plate	Tin and Terne Plate (hot-dipped)	Tin and Terne Plate (electrolytic)
Converters, Processors	2,607	1,249	1,020,968	823	122	7,673	7	8,868	225	3,069
Forgings (except automotive)	.....	8	1	.....	.....	.....	.....	.....	.....	.....
Bolts, Nuts, Rivets, Screws	34	.....	347,791	.....	.....	.....	.....	494	.....	.....
Jobbers, Dealers, Distributors	163,996	76,947	315,479	609,370	108,999	294,534	58,306	96,346	40,317	116,012
Construction, Maintenance	23,168	9,471	68,145	7,343	1,272	5,521	326	5,561	1,282	3,519
Contractors' Products	54,946	2,588	88,385	1,458	.....	61	.....	18,194	2,152	4,936
Automotive	204,500	12,745	330,643	321	.....	.....	.....	16,643	1,919	43,792
Rail Transportation	5,012	2,641	2,380	4,318	1,721	2,673	.....	119	519	214
Shipbuilding, Marine Equip.	312	1,200	807	46	.....	.....	.....	.....	.....	83
Aircraft	4,013	183	1,982	4	.....	.....	.....	.....	51	.....
Oil & Gas Drilling	16,697	1,746	183	20	.....	.....	.....	47	96	28
Mining, Quarrying, Lumbering	2,033	60	776	131	26	34	.....	.....	50	114
Agricultural	27,790	166	16,157	383	7	59	.....	617	78	911
Machinery, Indust. Equip., Tools	211,646	42,871	255,404	3,730	.....	.....	.....	7,905	3,623	16,291
Electrical Machinery & Equip.	13,598	692	65,296	221	.....	.....	.....	5,937	2,841	5,690
Appliances, Utensils, Cutlery	10,234	9,458	60,594	374	.....	.....	.....	59,429	8,862	20,752
Other Domestic, Commercial Equip.	34,061	25	401,692	1,009	.....	.....	.....	96,507	11,126	21,793
Containers	3,216	.....	105,341	8,724	12	.....	1,640	416,851	592,673	3,923,489
Ordnance & Other Military	18,356	556	5,839	360	2	.....	.....	99	4,952	307
Export	9,533	3,198	27,377	1,631	1,211	1,603	110	64,103	429,996	342,637
Unclassified	160,077	110,264	77,438	10,690	.....	.....	.....	.....	.....	.....
Total	965,829	276,068	3,192,678	650,956	113,372	312,158	60,389	797,720	1,100,762	4,503,637

Share of Steel

One of the largest gains came in the export classification. In 1955, 3,583,007 tons of steel went overseas, compared with 2,533,883 tons in 1954. That's an increase of 41 per cent, even though the European steel industry is increasing its capacity to meet the growing demands of its own boom period.

Stainless Gains—Of the three grades of steel—stainless, alloy other than stainless, and carbon—stainless showed the biggest percentage gain in shipments in 1955. The figure was 55.2 per cent, compared with 49.5 per cent for alloy, 33 per cent for carbon and 34.1 per cent for all grades. Automotive was also the biggest user of alloys, taking 2,122,267 tons. But in stainless, it took second place to warehouses and distributors, which took 188,311 tons. On the basis of per cent of increase, however, automotive is ahead, 65.7 to 52.8.

Where Alloy, Stainless Steel Went

(Mill Shipments in 1955)

	Alloy, other than stainless —net tons—	Stainless —net tons—
Converters, Processors	86,603	61,364
Forgings (except automotive)	517,513	13,986
Bolts, Nuts, Rivets, Screws	82,113	9,349
Jobbers, Dealers, Distributors	574,614	188,311
Construction, Maintenance	79,085	4,249
Contractors' Products	24,729	17,317
Automotive	2,122,267	143,016
Rail Transportation	156,945	5,244
Shipbuilding, Marine Equipment	44,762	2,259
Aircraft	46,300	22,379
Oil and Gas Drilling	208,938	405
Mining, Quarrying, Lumbering	29,108	415
Agricultural	39,231	464
Machinery, Industrial Equip., Tools	597,606	41,103
Electrical Machinery and Equipment	562,861	8,953
Appliances, Utensils, Cutlery	21,487	48,162
Other Domestic, Commercial Equipment	21,793	15,259
Containers	29,335	3,874
Ordnance and Other Military	92,191	3,035
Export	125,064	24,761
Unclassified	166,973	72,544
Total	5,629,518	686,449

MARKET CLASSIFICATION DURING 1955

Tables compiled by STEEL from American Iron & Steel Institute figures

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Track Spikes	Wheels	Axles	Bars, Hot-Rolled (and light shapes)	Bars, Concrete Reinforcing	Bars, Cold-Finished	Bars, Tool Steel	Standard Pipe	Oil Country Goods	Line Pipe	Market Classification
529	.....	.....	275,655	19,491	2,727	1,793	26,605	12,480	4,673	Converters, Processors
.....	.....	.....	512,331	.....	2,491	1,073	.....	.....	.....	Forgings (except automotive)
.....	.....	.....	513,064	.....	92,262	850	.....	.....	.....	Bolts, Nuts, Rivets, Screws
7,081	56	.....	1,271,511	884,473	422,809	16,436	2,162,563	2,080,432	876,049	Jobbers, Dealers, Distributors
1,530	4,671	1,014	695,883	1,038,069	3,905	97	139,908	27,917	1,897,976	Construction, Maintenance
.....	.....	.....	239,668	37,960	22,608	19	201,159	.....	15,048	Contractors' Products
.....	.....	.....	2,786,797	.....	549,725	1,672	5,300	.....	100	Automotive
81,573	282,017	111,653	270,331	576	5,620	24	7,489	.....	579	Rail Transportation
.....	81	.....	34,959	.....	5,755	1	12,471	.....	4,399	Shipbuilding, Marine Equip.
.....	.....	.....	25,263	.....	9,952	80	136	.....	57	Aircraft
.....	308	.....	177,154	573	9,741	.....	13,492	314,336	115,299	Oil & Gas Drilling
838	1,457	387	90,784	2,441	4,620	1,792	5,215	2,005	3,494	Mining, Quarrying, Lumbering
.....	.....	.....	428,683	601	84,515	255	38,317	.....	703	Agricultural
118	7,835	535	878,914	.....	402,020	17,109	41,157	.....	31,729	Machinery, Indust. Equip., Tools
.....	133	.....	137,094	.....	48,794	133	231,543	.....	1,901	Electrical Machinery & Equip.
.....	.....	.....	18,693	.....	44,139	70	9,020	.....	54	Appliances, Utensils, Cutlery
.....	.....	.....	87,195	503	40,942	88	7,474	.....	803	Other Domestic, Commercial Equip.
.....	.....	.....	7,106	.....	544	1	3,860	.....	184	Containers
.....	28	.....	80,598	.....	47,078	138	8,272	.....	600	Ordnance & Other Military
1,428	9,820	5,657	103,075	71,443	10,730	71	54,260	104,939	71,464	Export
.....	.....	.....	163,503	108,511	66,984	72,827	.....	.....	58,624	Unclassified
93,097	306,406	119,246	8,798,261	2,164,641	1,877,961	114,529	2,968,241	2,542,109	3,083,736	Total

Sheets, Hot-Rolled	Sheets, Cold-Rolled	Sheets, Galvanized	Sheets, Coated (all other)	Sheets and Strip, Electrical	Strip, Hot-Rolled	Strip, Cold-Rolled	Net Total	Per Cent of Total	Market Classification
607,945	226,379	43,845	1,973	1	199,858	73,192	3,753,381	4.43	Converters, Processors
1	27	.....	.....	.....	.....	.....	1,266,032	1.49	Forgings (except automotive)
62,028	5,018	81	.....	.....	3,862	17,924	1,475,340	1.74	Bolts, Nuts, Rivets, Screws
1,122,431	1,684,121	979,133	17,967	6,464	174,815	78,570	15,758,003	18.60	Jobbers, Dealers, Distributors
436,371	159,029	167,245	2,844	.....	80,404	18,282	9,681,778	11.43	Construction Maintenance
873,399	968,426	916,099	17,448	1,558	99,995	161,554	3,982,161	4.70	Contractors' Products
3,848,240	7,905,253	87,408	169,188	9,722	849,309	610,723	18,721,880	22.09	Automotive
204,432	16,776	45,746	37	5,646	29,553	3,792	3,520,849	4.16	Rail Transportation
10,071	1,816	8,938	2,451	36	1,299	294	601,234	0.71	Shipbuilding, Marine Equip.
6,489	9,311	2,018	571	1,130	535	4,322	96,892	0.12	Aircraft
7,277	2,434	1,199	.....	56	1,177	218	792,767	0.94	Oil & Gas Drilling
11,097	3,961	707	49	226	6,907	1,087	268,987	0.32	Mining, Quarrying, Lumbering
206,552	82,091	141,420	4,083	305	99,171	5,369	1,336,886	1.58	Agricultural
455,149	213,238	32,045	4,961	6,579	122,171	73,902	4,699,026	5.55	Machinery, Indust. Equip., Tools
235,927	385,427	46,567	12,268	667,896	74,487	120,861	2,291,866	2.70	Electrical Machinery & Equip.
199,153	1,428,728	111,941	20,166	17,988	21,336	145,060	2,199,114	2.60	Appliances, Utensils, Cutlery
158,438	966,437	61,549	6,665	5,162	57,154	192,866	2,189,416	2.58	Other Domestic, Comm. Equip.
624,952	551,882	51,644	1,025	.....	236,166	126,361	6,723,074	7.93	Containers
94,527	49,479	1,961	316	190	4,803	14,190	856,527	1.01	Ordnance & Other Military
262,869	507,795	164,951	13,034	68,084	26,489	28,960	3,583,077	4.23	Export
3,363	1	.....	.....	.....	.....	57,102	919,154	1.09	Unclassified
9,430,711	15,167,629	2,864,497	275,046	791,043	2,089,491	1,734,629	84,717,444	100.00	Total

Sheets, Strip . . .

Sheet & Strip Prices, Pages 149 & 150

Reflecting growing concern over the possibilitiy of a steel strike this summer, inquiry for hot and cold-rolled sheets is increasing. Most of the mills, however, have more tonnage on their books than they can satisfactorily handle in the remaining months of the first half, so there is little likelihood consumers will be able to place more than their usual tonnage for second quarter shipment.

Pittsburgh district mills think sheet demand will strengthen in May and June. They reason that the cutbacks of March and April orders will correct the automotive inventory position, with the result auto builders will need their full tonnage for May and June.

Reductions in auto needs in recent weeks have been offset by increases in demand from other customers. This is notably so in hot-rolled sheets. In the East, for instance, the auto cutbacks had no important effect on over-all supply of both hot and cold-rolled sheets. Sellers in the area still are faced with more demand than they can promptly satisfy.

Galvanized sheet supply has been adequate in recent weeks, but a seasonal upturn in demand could tighten things in this area. In fact, tightening in supplies seems likely in view of the imminence of another government storage bin program.

Northeastern Steel Corp., Bridgeport, Conn., has resumed production of hot-rolled strip following a blooming mill breakdown. Two weeks of output was lost. The blooming mill was down almost a month.

Kaiser Steel Corp. has raised prices on hot-rolled sheets and strip $1 per ton; on hot-rolled alloy strip, $2; and on cold-rolled sheets, $2. Prices on cold-rolled strip held unchanged. The increases reflect the boost in freight rates.

The Navy, on Mar. 21, takes estimates on 1195 tons of galvanized sheets for delivery at east and west coast yards. Procurement is by the General Stores Supply Depot, Philadelphia.

The Navy and service departments are opening bids on sheet requirements for second quarter in heavier volume. Included is a closing Mar. 21 on 330 tons of carbon steel sheets for the Raritan, N. J., arsenal.

Wire . . .

Wire Prices, Pages 150 & 151

Resumption of volume buying on automotive account is expected in the second quarter. In New England, there has been some improvement in demand for spring and heading wire, in which grades shipment deferments were the heaviest. Strong demand for reinforcing wire, including prestressed concrete structures, operates against any easing in rods.

Steel Bars . . .

Bar Prices, Page 148

The somewhat smaller requirements of agricultural implement makers are taking some of the pressure off hot-rolled carbon bars at Midwest points. Heavy inventories of farm equipment, and the extended strike at plants of Deere & Co., are responsible for the reduced demand. Automotive requirements also are off. As a result, barmakers have more flexibility in scheduling and shipping.

Over-all, demand for hot bars still exceeds supply. Those makers that have opened books for the entire second quarter already have taken in all the tonnage they can handle in the period. Bolt and nut makers and cold finishers are pressing particularly hard for hot bar tonnage in the East. While the situation in hot alloy bars is less stringent, still, sellers antici-

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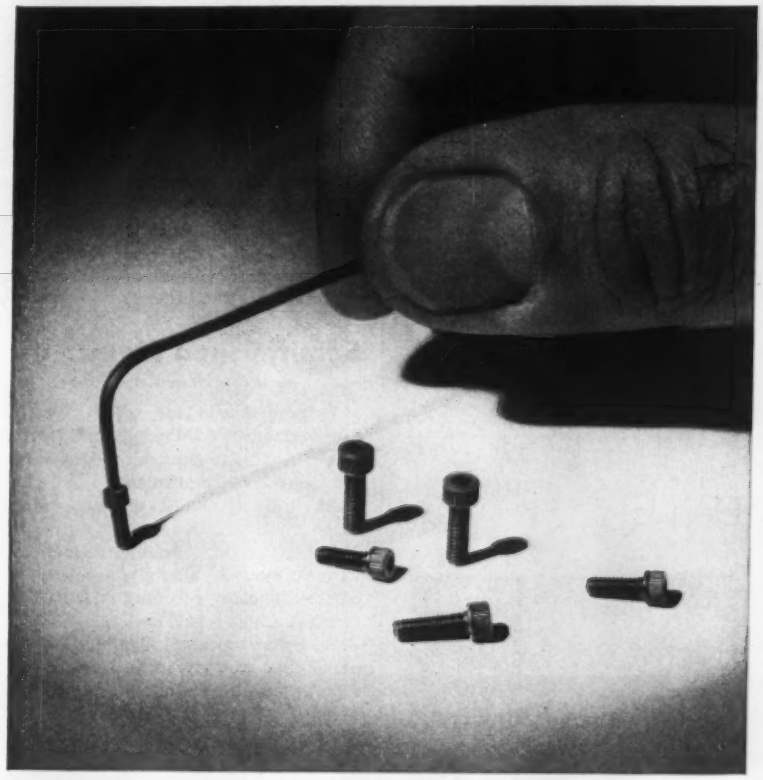

Standard UNBRAKO miniature socket head cap screws are available in sizes # 0, # 1, # 2 and # 3, in heat treated alloy steel or stainless steel, at your authorized industrial distributor's. Standard lengths range from ⅛ to ½ in.

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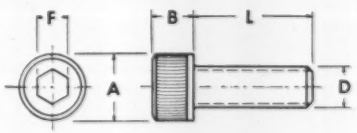

	Diameter	Threads per Inch NC	Threads per Inch NF	Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per 1000 in Pounds
#0	A .104		80	⅛		2.0	.152
	B .060		80	3/16		2.0	.182
	D .060		80	¼		2.0	.210
	F .050		80	⅜		2.0	.265
#1	A .118		72	⅛	3.5	3.5	.27
	B .073		72	3/16	3.5	3.5	.32
	D .073		72	¼	3.5	3.5	.37
	F .050		72	⅜	3.5	3.5	.47
#2	A .140	56		3/16	6.0	6.0	.42
	B .086	56		¼	6.0	6.0	.50
	D .086	56		⅜	6.0	6.0	.58
	F 1/16	56		½	6.0	6.0	.70
#3	A .161	48		3/16	8.5	9.5	.59
	B .099	48		¼	8.5	9.5	.70
	D .099	48		⅜	8.5	9.5	.81
	F 5/64	48		½	8.5	9.5	1.03

Tiny close-tolerance Unbrako screws available in standard sizes

New economies in the design of space-saving miniature equipment are possible with these UNBRAKO miniature socket head cap screws. Manufactured to timepiece precision, available locally, they save the costly necessity of designing special screws to fasten tiny parts in compact units. They're ideal for use in typewriters, calculators and computers, servomechanisms, electric and electronic equipment—and in countless other small, intricate devices where maximum reduction in bulk and weight is required with no sacrifice in strength of individual components or assemblies.

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Standard Screws are threaded to the head. Special materials, lengths, and threaded lengths are available. One "High-Titan" UNBRAKO hex key is included with each package of 100 screws.

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SOCKET SCREW DIVISION

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JENKINTOWN PENNSYLVANIA

pate brisk business into the last half of the year. Most buyers stand little chance of getting more tonnage in second quarter than they did in the first three months, despite the slower automotive demand.

There is some uncertainty as to second quarter automotive demand. Some sellers anticipate a pickup in buying late in the period. However, hot carbon bar orders for late second quarter delivery are developing at a slower pace. Producers are getting closer to delivery schedules on more sizes in the East. Alloys are in ample supply there.

Tin Plate . . .

Tin Plate Prices, Page 150

U. S. Steel Corp. and its operating divisions, Columbia-Geneva Steel and Tennessee Coal & Iron, announced prices on electrolytic and hot dipped tin plate, black plate and terne plate will be increased 40 cents per base box for the contracting period Apr. 30 through Oct. 31. The average increase is about 5 per cent for all tin mill products.

The established contracting period in tin plate extends from Apr. 1 to Oct. 1. This year, however, the contracting period doesn't begin until May 1. It was pushed back a month to give consumers an opportunity to build inventories before new prices became effective.

Shipments of metal cans in January totaled 290,031 tons, compared with 270,693 in December and 279,551 in January, 1955, reports the Census Bureau.

The movement of fruit and vegetable cans totaled 69,801 tons, against 55,465 in December and 66,503 in the corresponding month of last year. Shipments of beer cans amounted to 43,696 tons, compared with 44,256 in December and 40,659 in January, 1955.

Semifinished Steel . . .

Semifinished Prices, Page 148

To compensate for recent freight rate increases, Kaiser Steel Corp., Oakland, Calif., announced revisions in prices on semifinished and finished steel products, effective Mar. 12.

Under its new schedule, Kaiser advanced blooms, billets and slabs $2 per ton, quoting rerolling quality $78, forging quality $94 and alloy billets $117. Prices on shell steel billets are unchanged at $123.50. All prices are f.o.b. Fontana, Calif.

Tubular Goods . . .

Tubular Goods Prices, Page 152

First signs of a seasonal pickup in sales of merchant pipe are appearing. Standard pipe for construction applications is moving more actively, and April order books are reported filling rapidly. The mills are sold out far ahead on line pipe, of course, some of them being booked up for 18 months or more. Oil country goods makers also are committed for months ahead, through the first of the year in most cases.

Extended deliveries and the shortage of seamless pipe will delay expansion programs of New England utility companies. Pipe that is wanted for second quarter cannot be had until third quarter and later shipment.

While 2750 tons of pipe piling have been placed for naval shipyard piers at Boston, piling needed for heavy construction foundations cannot be shipped in time to meet driving schedules, and some substructure specifications are being revised. The only tubular products in ample supply for prompt shipment in New England are buttweld pipe and light-wall welded tubing in strip gages.

Kaiser Steel Corp. raised prices approximately $2 per ton, effective

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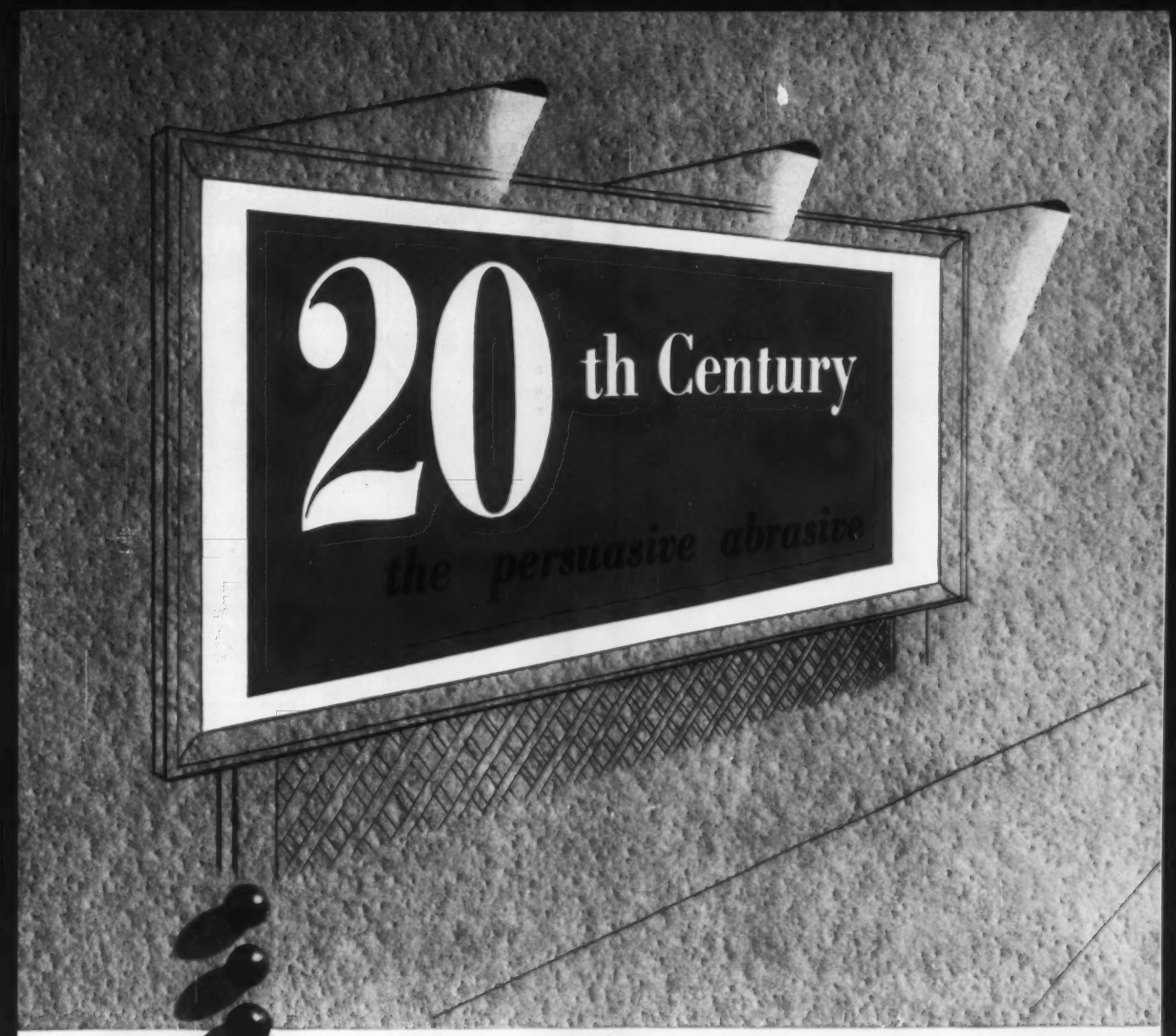

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One of the world's largest producers of quality shot and grit — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)

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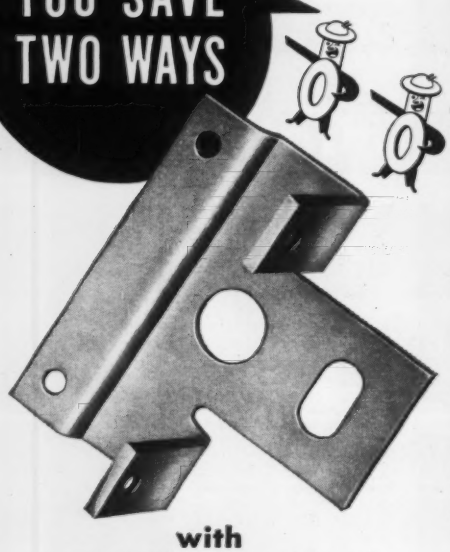

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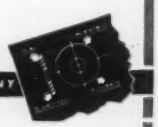

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P

Why cast...forge...or hog it... if you can do it better with a DRESSER WELDMENT?

Autoclave's all-welded construction eliminates rivets, other sources of leakage. Monel weldments effect substantial savings in fabrication.

If you have angle or channel shaped rings in circular assemblies that are hard to make and subject to high rejections, they can probably be made better and cheaper with Dresser Weldments.

Contour bars—extruded or shaped by specially designed mill rolls—leave a minimum of excess stock for finishing. Formed, automatically flash-welded and expanded to accurate dimensions, many special-shaped parts and rings need little or no machining. Often, savings on end scrap alone pay for the finished part.

Typical Dresser Weldments

- *Rings and Cylinders*—circular elements may also be combined into composite weldment.
- *Hot-Formed Circular Parts* — extensive banks of presses and furnaces offer you economies in volume production.
- *Shafts or Circular Parts Welded from Dissimilar Metals* — available with a portion of the part resistant to heat, corrosion or abrasion—or provided with greater strength or hard surface in a localized section.

We'll gladly make recommendations at no cost to you. Just send us your sketch or print.

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DRESSER WELDMENTS

Dresser Manufacturing Division

119 FISHER AVENUE • BRADFORD, PA.

Mar. 12, on continuous weld pipe, and $1 per ton on electric weld pipe. The higher prices reflect the recent hike in freight rates.

Plates . . .

Plate Prices, Page 148

Platemakers continue to turn orders away, and it begins to look like not much change in tight supply conditions will be experienced over the remainder of the year. Demand is coming from all segments of consuming industry. No single market area seems to be getting enough tonnage to satisfy its needs. This includes the warehouses which are virtually overwhelmed with inquiry.

Whether the mills can ship more plates in the second quarter than they ship in the current three months will depend largely on how their facilities stand up. In the light of automotive sheet order cutbacks, some continuous mills may produce more strip plate than seemed likely a month or so back. Considering the pressure for plates on railroad car account, the strip mills would have no difficulty disposing of every ton of plates they turned out.

In the East, production may be favored by somewhat less operational difficulties at the Claymont, Del., works of the Claymont Products Department of Colorado Fuel & Iron Corp. This producer expects to get its smaller mill back into operation shortly after Apr. 1. It has been down for repairs since mid-January.

Midwestern sellers would welcome some relief from the pressing demand. A balanced situation is unlikely any time soon, however. Every consuming need appears to be expanding. Production on continuous sheet mills would provide relief, but there is little likelihood sheet demand will shrink enough to permit extensive scheduling of plates.

New England shops hesitate to book additional contracts requiring plate tonnage beyond their quotas.

Kaiser Steel Corp. raised prices on plates $1 per ton (effective Mar. 12) to reflect the recent increase in freight rates.

Warehouse . . .

Warehouse Prices, Page 153

Distributors are analyzing recent freight rate increases preparatory to making necessary changes in their price schedules. Meanwhile, their business is active. They are able to move all the tonnage in the major grades that are available.

Demand for plates, shapes and hot-rolled sheets is as strong as ever. A slight easing has developed in gal-

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)	26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$34.00-$34.50
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	33.00-35.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.10

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ¼-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Birmingham, ovens	$25.65
Cincinnati, deld.	30.58
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Camden, N. J., ovens	26.50
Chicago, ovens	27.00
Chicago, deld.	28.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	*28.55
Indianapolis, ovens	26.75
Ironton, O., ovens	26.00
Cincinnati, deld.	28.59
Kearny, N. J., ovens	26.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	27.50
Neville Island, (Pittsburgh) Pa., ovens	26.25
Painesville, O., ovens	27.50
Cleveland, deld.	29.43
Philadelphia, ovens	26.50
St. Louis, ovens	28.50
St. Paul, ovens	26.50
Swedeland, Pa., ovens	26.50
Terre Haute, Ind., ovens	26.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

vanized and cold-rolled sheets, as well as hot-rolled and cold-finished bars. Alloys and nickel-free stainless are freely available.

Weirton Steel Co., Weirton, W. Va., division of National Steel Corp., will open a warehouse in Oakland, Calif., in May. The firm will lease a $600,000 warehouse to be built by Bigge Drayage Co.

Steel Holds Torrid Pace

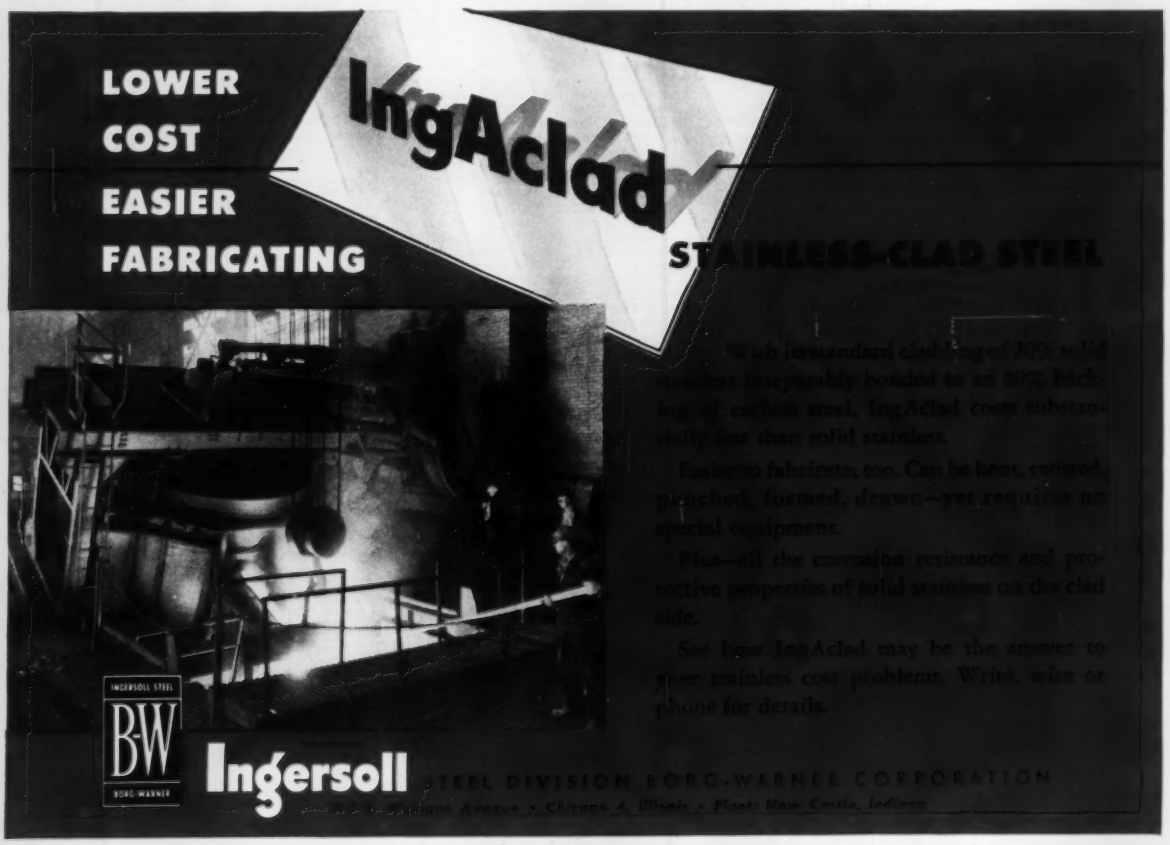
For the fifth consecutive month, production of steel exceeded 10 million tons in February, reports the American Iron & Steel Institute. The total for the month was 10,121,000 net tons, a record for the month. The figure compares with 10,828,231 net tons in January and 8,496,934 in February, 1955.

The institute's preliminary report shows that steelmaking furnaces operated at an average of 99.2 per cent of capacity in February, against 99.3 in January and 88 in February a year ago.

The index of steel production (1947-49 equals 100) was 152.1 in February, compared with 152.2 in January and 132.2 in February last year.

Period	OPEN HEARTH Net tons	OPEN HEARTH Per cent of capacity	OPEN HEARTH ‡Index	BESSEMER Net tons	BESSEMER Per cent of capacity	BESSEMER ‡Index	ELECTRIC Net tons	ELECTRIC Per cent of capacity	ELECTRIC ‡Index	TOTAL Net tons	TOTAL Per cent of capacity	TOTAL ‡Index	Calculated weekly production (Net tons)
1956													
*January	9,676,151	101.4	151.1	323,235	79.5	92.0	828,845	86.6	232.1	10,828,231	99.3	152.2	2,444,296
†February	9,045,000	101.4	150.9	297,000	78.1	90.4	779,000	87.1	233.1	10,121,000	99.2	152.1	2,445,000
1955													
January	8,054,345	86.0	125.7	199,229	49.0	56.7	584,162	63.6	163.6	8,837,736	82.7	124.2	1,994,974
February	7,734,884	91.5	133.7	197,091	53.7	62.1	564,959	68.1	175.1	8,496,934	88.0	132.2	2,124,233
March	9,060,026	96.7	141.4	255,493	62.8	72.7	666,235	72.6	186.5	9,981,754	93.4	140.3	2,253,281
1st Quarter	24,849,255	91.4	133.6	651,813	55.2	63.9	1,815,356	68.1	175.1	27,316,424	88.0	132.3	2,124,139
April	8,858,549	97.7	142.9	275,069	69.8	80.9	681,477	76.6	197.2	9,815,095	94.8	142.6	2,287,901
May	9,307,291	99.4	145.3	305,347	75.1	86.9	715,678	77.9	200.4	10,328,316	96.6	145.2	2,331,448
June	8,764,430	96.6	141.4	283,544	72.0	83.4	698,493	78.6	202.1	9,746,467	94.1	141.6	2,271,904
2nd Quarter	26,930,270	97.9	143.2	863,960	72.3	83.8	2,095,648	77.7	199.9	29,889,878	95.2	143.1	2,297,454
1st 6 Months	51,779,525	94.7	138.5	1,515,773	63.8	73.9	3,911,004	72.9	187.5	57,206,302	91.6	137.7	2,211,299
July	8,232,535	88.1	128.5	268,348	66.1	76.4	600,063	65.5	168.0	9,100,946	85.3	127.9	2,059,038
August	8,600,612	91.8	134.3	298,972	73.5	85.1	694,000	75.7	194.6	9,594,545	89.7	134.9	2,165,812
September	8,829,266	97.6	142.4	307,171	78.2	90.3	745,888	84.1	215.8	9,882,325	95.7	143.5	2,308,954
3rd Quarter	25,662,413	92.4	135.0	874,491	72.6	83.9	2,040,912	75.0	192.5	28,577,816	90.2	135.4	2,176,528
9 Months	77,441,938	93.9	137.3	2,390,264	66.8	77.2	5,951,916	73.6	189.2	85,784,118	91.1	136.9	2,199,593
October	9,369,704	100.0	146.3	330,150	81.2	94.0	801,196	87.3	224.3	10,501,050	98.2	147.6	2,370,440
November	9,141,244	100.8	147.5	306,674	77.9	90.2	799,480	89.9	231.3	10,247,398	99.0	148.8	2,388,671
December	9,406,531	100.7	146.9	292,429	72.1	83.2	804,559	87.8	225.3	10,503,519	98.5	147.6	2,376,362
4th Quarter	27,917,479	100.5	146.9	929,253	77.0	89.1	2,405,235	88.3	226.9	31,251,967	98.6	148.0	2,378,384
Last Half	53,579,892	96.5	140.9	1,803,744	74.8	86.5	4,446,147	81.7	209.7	59,829,783	94.4	141.7	2,277,495
Total 1955	105,359,417	95.6	139.7	3,319,517	69.3	80.2	8,357,151	77.3	198.7	117,036,085	93.0	139.7	2,244,651

Note—The percentages of capacity operated are calculated on weekly capacities in 1956 of 2,154,144 net tons open hearth, 91,810 net tons bessemer and 215,939 net tons electric ingots and steel for castings, total 2,461,893 net tons; based on annual capacities as of Jan. 1, 1956, as follows: Open hearth 112,317,040 net tons, bessemer 4,787,000 net tons, electric 11,259,050 net tons, total 128,363,090 net tons.
Note—The percentages of capacity operated are calculated on weekly capacities in 1955 of 2,114,196 net tons open hearth, 91,810 net tons bessemer and 207,272 net tons electric ingots and steel for castings, total 2,413,278 net tons; based on annual capacities as of Jan. 1, 1955, as follows: Open hearth 110,234,160 net tons, bessemer 4,787,000 net tons, electric 10,807,150 net tons, total 125,828,310 net tons.
*Revised. †Preliminary figures, subject to revision. ‡Index of production based on average weekly production of the three years 1947-1948-1949.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With inexpensive cladding of 20% solid stainless inseparably bonded to an 80% backing of carbon steel, IngAclad costs substantially less than solid stainless.
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Plus—all the corrosion resistance and protective properties of solid stainless on the clad side.
See how IngAclad may be the answer to your stainless cost problems. Write, wire or phone for details.
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Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $94; 19-21% Mn, 1-3% Si, $91.50; 16-19% Mn, $89.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $205. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $213 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 30.95c per lb of contained Mn, carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.4c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb, 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02% max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb of alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅛ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7c, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 13.15c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 lb to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 200 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

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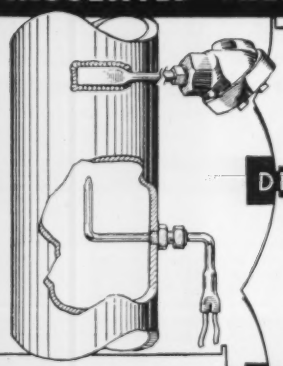

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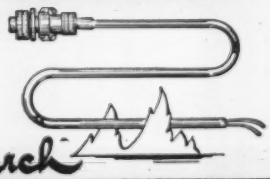

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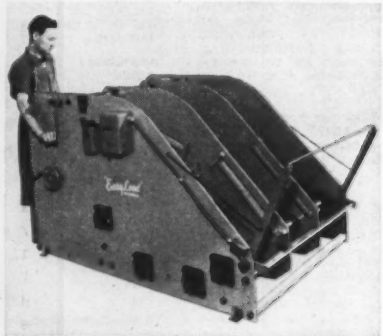

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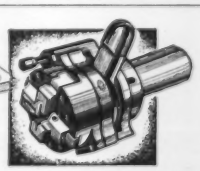

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Scrap . . .

Scrap Prices, Page 166

Chicago—Scrap prices are rising again in this market. The last few days have seen an increase of $2 a ton in almost all grades, and there are hints of further rise. A tipoff to the higher level was broker buying of material to fill old contracts. These buying prices were $1 or more a ton above those called for in month-old orders.

Boston — Steel scrap prices are steadier. The best price paid for No. 1 heavy melting was $41, shipping point, for district consumption. Some old orders are being completed at $40. Northeastern Steel Corp., Bridgeport, Conn., has resumed scrap melting after losing nearly one month's ingot production due to a blooming mill breakdown.

New York — Scrap prices have stiffened. Brokers are offering to buy No. 1 heavy melting and No. 1 bundles at $44-$45, and have advanced their buying prices $1 a ton on machine shop turnings to $26-$27, mixed borings and turnings to $28-$29, short shoveling turnings to $30-$31 and low phos structural and plate to $46-$47. They have dipped their prices for No. 1 cupola to $42-$43, but have increased heavy breakable $1 to $46-$47.

Philadelphia—Sentiment in scrap is mixed. Prime steel grades are strong, but prices on the secondary grades are easier at $42, delivered, for No. 2 heavy melting steel and $39-$39.50 for No. 2 bundles. Machine shop turnings are lower at $34, delivered.

There is relatively little scrap at dealers' yards, but material is coming out in sufficient quantity to meet consuming requirements. Export shipments are relatively light.

Further buying by the Fairless, Pa., consumer of No. 1 cupola cast at $50, delivered, has advanced the market on that grade to $49-$50, delivered. Heavy breakable also is stronger at $52-$53, delivered.

Pittsburgh—No. 1 heavy melting scrap is firmer. A mill in the area bought small tonnage at $50, but that grade can be bought here for $49. Prices are largely nominal in the absence of major purchases. Increased demand for high quality scrap is shown by the railroad lists. No. 1 railroad heavy melting sold for $58 a ton, an increase of $3. Rails increased $1 a ton. Mills are slowing down in their demand for stainless scrap, bidding $330 to $340 for 18-8 bundles and solids.

Cleveland — Tightening supplies of scrap in this general area tend to stiffen prices on the steelmaking grades. Based on one representative local sale of No. 1 heavy melting, that grade is quoted up $1 a ton. Brokers, however, are reported offering higher for quality material.

Buffalo—Scrap prices have leveled off, but there is a firm tone in the better grades. This results from short supplies and bidding by out-of-district interests. No. 1 heavy melting is established at $47-$48, low phos, $53-$54; No. 2 heavy melting, $39; and No. 2 bundles, $36.

Cincinnati — Prices are slightly stronger here. No. 2 heavy melting steel advanced to $37-$38, and No. 2 bundles to $36-$37, both grades being up $1 a ton. Flood conditions on the Ohio river are hampering barge movement of scrap.

Birmingham—There is little activity in scrap here. The largest buyer of open-hearth grades is out of the market, and the Atlanta mill is holding up shipments. A number of foundries are not buying, while an electric furnace is ordering sparingly. Some brokers' offers for open-hearth grades are off $2 from recent prices.

St. Louis—The downtrend in scrap appears to have been stopped with a general firming up of prices on various grades. A slight increase is noted in selected railroad items. No. 1 railroad heavy melting is up $2 a ton, and rails, random lengths, $1.50. A considerable tonnage of re-rolling rails is by-passing the local market.

(*Please turn to page* 168)

January Steel Shipments Up

Shipments of finished steel products in January totaled 7,587,870 net tons, reports the American Iron & Steel Institute. This was the second highest monthly total in history, topped only by the 7,770,213 tons moved in June, 1955.

Records were established during the month in shipments of oil country goods (247,217 net tons), and galvanized sheets (269,464 tons). Detailed figures are given in the accompanying table.

Automotive continued the leading consuming classification during the month, taking 1,614,000 tons, against 1,560,000 in January, 1955. Other leading markets: Warehouses, 1,413,000, against 1,033,000 a year ago; construction, 834,000, against 558,000; containers, 598,000, against 485,000; machinery, etc., 442,000, against 333,000.

Shipments of Steel Products—January, 1956*

(Net Tons; All Grades)

Products	Carbon	Alloy	Stainless	Jan., 1956 Total	Jan., 1955 Total
Ingots and castings	51,008	15,677	2,163	68,848	30,276
Blooms, slabs, etc.	172,095	54,247	2,263	228,605	172,628
Tube rounds	–13	329	.....	316	.....
Skelp	14,013	.....	.....	14,013	6,011
Wire rods	102,150	2,334	389	104,013	84,832
Shapes (heavy)	433,081	3,431	3	436,515	336,095
Steel piling	30,224	.....	.....	30,224	21,480
Plates	609,305	38,165	2,410	649,880	438,718
Rails (standard)	120,942	.....	.....	120,942	92,439
Rails (other)	10,208	.....	.....	10,208	4,679
Joint bars	5,928	.....	.....	5,928	3,283
Tie plates	33,518	.....	.....	33,518	15,626
Track spikes	8,929	.....	.....	8,929	4,965
Wheels	30,029	70	.....	30,099	21,805
Axles	13,439	18	.....	13,457	7,358
Bars (hot rolled)	602,923	210,453	4,587	817,963	623,166
Bars (reinforcing)	181,906	.....	.....	181,906	115,750
Bars (cold drawn)	142,127	30,618	5,303	178,048	135,605
Tool steel	1,567	9,546	.....	11,113	7,822
Standard pipe	240,288	2	.....	240,290	194,192
Oil country goods	205,217	42,000	.....	247,217	178,910
Line pipe	273,673	.....	.....	273,673	119,377
Mechanical tubing	60,686	28,284	349	89,319	66,222
Pressure tubing	22,363	4,817	1,391	28,571	18,996
Wire (drawn)	260,364	4,446	3,219	268,029	216,918
Nails & staples	50,091	.....	.....	50,091	49,480
Wire (barbed)	7,148	.....	.....	7,148	10,855
Woven fence	24,956	.....	.....	24,956	29,091
Bale ties	3,051	.....	.....	3,051	2,291
Black plate	71,092	.....	.....	71,092	62,273
Tin & terne plate (HD)	81,034	.....	.....	81,034	82,874
Tin plate (electro)	402,627	.....	.....	402,627	335,682
Sheets (hot rolled)	801,886	40,210	1,861	843,957	733,690
Sheets (cold rolled)	1,290,315	6,566	12,789	1,309,670	1,187,104
Sheets (galvanized)	269,464	.....	.....	269,464	211,101
Sheets (other coated)	24,575	.....	.....	24,575	20,671
Sheets (enameling)	(Included in cold-rolled sheets)			.....	20,066
Sheets & strip (elec.)	11,839	60,061	.....	71,900	56,811
Strip (hot rolled)	165,506	3,237	314	169,057	158,088
Strip (cold rolled)	141,201	1,458	24,105	166,764	132,628
1956 Total shipments	6,970,755	555,969	61,146	7,587,870	6,009,958
1955 Total shipments	5,559,074	402,745	48,139	6,009,958	.....

*Source: American Iron & Steel Institute.

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 14	$49.17
Mar. 7	48.50
Feb. Avg.	48.96
Mar. 1955	37.50
Mar. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	48.00-49.00
No. 2 heavy melting	44.00-45.00
No. 1 bundles	48.00-49.00
No. 2 bundles	40.00-41.00
No. 1 busheling	48.00-49.00
Machine shop turnings	33.00-34.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Cut structurals, 3 ft lengths	*57.00-58.00*
Heavy turnings	44.00-45.00
Punching & plate scrap	*57.00-58.00*
Electric furnace bundles	52.00-53.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Charging box cast	45.00-46.00
Heavy breakable cast	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 machinery cast	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt	*57.00-58.00*
Rails, 2 ft and under	*67.00-68.00*
Rails, 18 in. and under	*68.00-69.00*
Rails, random lengths	*63.00-64.00*
Railroad specialties	*61.00-62.00*

Stainless Steel Scrap

18-8 bundles & solids	*330.00-340.00*
18-8 turnings	*225.00-235.00*
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	*50.00-51.00*
No. 2 heavy melting	45.00-46.00
No. 1 bundles	*50.00-51.00*
No. 2 bundles	38.00-39.00
No. 1 busheling	*50.00-51.00*
Machine shop turnings	29.00-30.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Low phos.	*56.00-57.00*
Cut structural plates 2 ft and under	*56.00-57.00*
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	*51.00-52.00*

Cast Iron Grades

No. 1 cupola	54.00-55.00
Charging box cast	47.00-48.00
Stove plate	52.00-53.00
Heavy breakable cast	46.00-47.00
Unstripped motor blocks	30.00-32.00
Brake shoes	41.00-42.00
Clean auto cast	54.00-55.00
Burnt cast	41.00-42.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under	*69.00-70.00*
Rails, 18 in. and under	*70.00-71.00*
Rails, random lengths	*65.00-66.00*
Cast steel	*59.00-60.00*
Railroad specialties	*59.00-60.00*
Uncut tires	*60.00-61.00*
Angles, splice bars	*65.00-66.00*
Rails, rerolling	*68.00-69.00*

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	340.00-350.00
18-8 turnings	200.00-210.00
430 clips, bundles, solids	105.00-115.00
430 turnings	55.00-65.00

YOUNGSTOWN

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	41.00-42.00
No. 1 bundles	52.00-53.00
No. 2 bundles	38.00-39.00
No. 1 busheling	52.00-53.00
Machine shop turnings	29.00-30.00
Short shovel turnings	34.00-35.00
Cast iron borings	34.00-35.00
Low phos.	53.00-54.00
Electric furnace bundles	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	*55.00-56.00*

CHICAGO

No. 1 heavy melting	*48.00-50.00*
No. 2 heavy melting	*39.00-40.00*
No. 1 factory bundles	*51.00-52.00*
No. 1 dealer bundles	*48.00-49.00*
No. 2 bundles	*36.00-37.00*
No. 1 busheling	*48.00-50.00*
Machine shop turnings	*27.00-28.00*
Mixed boring, turnings	*29.00-30.00*
Short shovel turnings	*29.00-30.00*
Cast iron borings	*29.00-30.00*
Cut structurals, 3 ft	*53.00-54.00*
Punchings & plate scrap	*54.00-55.00*

Cast Iron Grades

No. 1 cupola	*48.00-49.00*
Stove plate	*42.00-43.00*
Unstripped motor blocks	*38.00-39.00*
Clean auto cast	*53.00-54.00*
Drop broken machinery	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt	*51.00-52.00*
R.R. malleable	*60.00-61.00*
Rails, 2 ft and under	*65.00-66.00*
Rails, 18 in. and under	*66.00-67.00*
Angles, splice bars	*63.00-64.00*
Rails, rerolling	*66.00-67.00*

Stainless Steel Scrap

18-8 bundles & solids	*345.00-360.00*
18-8 turnings	*250.00-260.00*
430 bundles & solids	105.00-110.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.00
No. 2 heavy melting	32.00
No. 1 bundles	45.00
No. 2 bundles	33.00
No. 1 busheling	45.00
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	25.00
Punching & plate scrap	54.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	37.00
Stove plate	37.00
Heavy breakable	35.00
Unstripped motor blocks	25.00
Clean auto cast	46.00
Malleable	42.00

BIRMINGHAM

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*35.00-36.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*27.00-28.00*
No. 1 busheling	*37.00-38.00*
Cast iron borings	20.50-21.50
Short shovel turnings	*27.00-28.00*
Machine shop turnings	*25.00-26.00*
Electric furnace bundles	44.00-45.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	51.00-52.00
Structural & plate, 2 ft.	50.00-51.00
Unstripped motor blocks	37.00-38.00
Charging box cast	32.00-33.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	47.00-48.00
Rails, 18-in. and under	*60.00-61.00*
Rails, rerolling	61.00-62.00
Rails, random lengths	*57.00-58.00*
Angles, splice bars	57.00-58.00

PHILADELPHIA

No. 1 heavy melting	50.00
No. 2 heavy melting	*42.00*
No. 1 bundles	50.00
No. 2 bundles	*39.00-39.50*
No. 1 busheling	50.00
Electric furnace bundles	52.00-53.00†
Mixed borings, turnings	36.00
Machine shop turnings	*34.00*
Short shovel turnings	38.00
Heavy turnings	46.00
Structurals & plate	54.00-56.00
Couplers, springs, wheels	58.00
Rail crops, 2 ft & under	64.00-65.00†

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Malleable	68.00
Heavy breakable cast	*52.00-53.00*
Drop broken machinery	54.00-55.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*44.00-45.00*
No. 2 heavy melting	37.00-38.00
No. 1 bundles	*44.00-45.00*
No. 2 bundles	32.00-33.00
Machine shop turnings	*26.00-27.00*
Mixed borings, turnings	*28.00-29.00*
Short shovel turnings	*30.00-31.00*
Low phos. (structural & plate)	*46.00-47.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Unstripped motor blocks	30.00-32.00
Heavy breakable	*46.00-47.00*

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*40.00-41.00*
No. 2 heavy melting	32.00-33.00
No. 1 bundles	*40.00-41.00*
No. 2 bundles	30.00-31.00
No. 1 busheling	41.00
Machine shop turnings	*24.00-24.50*
Mixed borings, turnings	*27.00-27.50*
Short shovel turnings	*28.00-28.50*
No. 1 cast	40.50-41.00
Mixed cupola cast	38.00-39.00
No. 1 machinery cast	42.00-43.00

BUFFALO

No. 1 heavy melting	*47.00-48.00*
No. 2 heavy melting	*38.00-39.00*
No. 1 bundles	*47.00-48.00*
No. 2 bundles	*35.00-36.00*
No. 1 busheling	*47.00-48.00*
Mixed borings, turnings	*28.00-29.00*
Machine shop turnings	*26.00-27.00*
Short shovel turnings	*29.00-30.00*
Cast iron borings	*28.00-29.00*
Low phos.	*52.00-53.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*48.00-49.00*
No. 1 machinery	*51.00-52.00*

Railroad Scrap

Rails, random lengths	*58.00-59.00*
Rails, 3 ft and under	*64.00-65.00*
Railroad specialties	*55.00-56.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.50-46.50
No. 2 heavy melting	*37.00-38.00*
No. 1 bundles	45.50-46.50
No. 2 bundles	*36.00-37.00*
No. 1 busheling	45.50-46.50
Machine shop turnings	29.50-30.50
Mixed borings, turnings	30.00-31.00
Short shovel turnings	31.50-32.50
Cast iron borings	30.00-31.00
Low phos., 18 in.	54.00-55.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Heavy breakable cast	42.00-43.00
Charging box cast	42.00-43.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	50.00-51.00
Rails, 18 in. and under	65.00-66.00
Rails, random lengths	58.00-59.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	40.50
No. 2 heavy melting	37.00
No. 1 bundles	40.50
No. 2 bundles	32.00
No. 1 busheling	40.50
Machine shop turnings	26.00
Short shovel turnings	28.50

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	39.00
Unstripped motor blocks	38.00
Brake shoes	43.00
Clean auto cast	48.00
Stove plate	40.00

Railroad Scrap

No. 1 R.R. heavy melt	*51.50*
Rails, 18 in. and under	64.00
Rails, random lengths	*59.50*
Rails, rerolling	65.00
Angles, splice bars	54.00

SEATTLE

No. 1 heavy melting	38.00
No. 2 heavy melting	35.00
No. 1 bundles	34.00
No. 2 bundles	26.00
No. 3 bundles	17.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, bundles	*52.00-55.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*40.00*
Heavy breakable cast	*33.00*
No. 1 wheels	35.00
Unstripped motor blocks	30.00
Clean motor blocks	35.00
Stove plate (f.o.b. plant)	30.00
Brake shoes	30.00

Railroad Scrap

Rails, random lengths	38.00

LOS ANGELES

No. 1 heavy melting	42.00
No. 2 heavy melting	36.00
No. 1 bundles	39.00
No. 2 bundles	32.00
Machine shop turnings	18.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	46.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	30.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 1 busheling	36.00
Machine shop turning	20.00-23.00
Mixed borings, turnings	20.00-23.00
Cast iron borings	20.00-23.00
Short shovel turnings	25.00
Ctu structurals	45.00
Heavy turnings	20.00-23.00
Punchings & Plate scrap	44.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	45.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

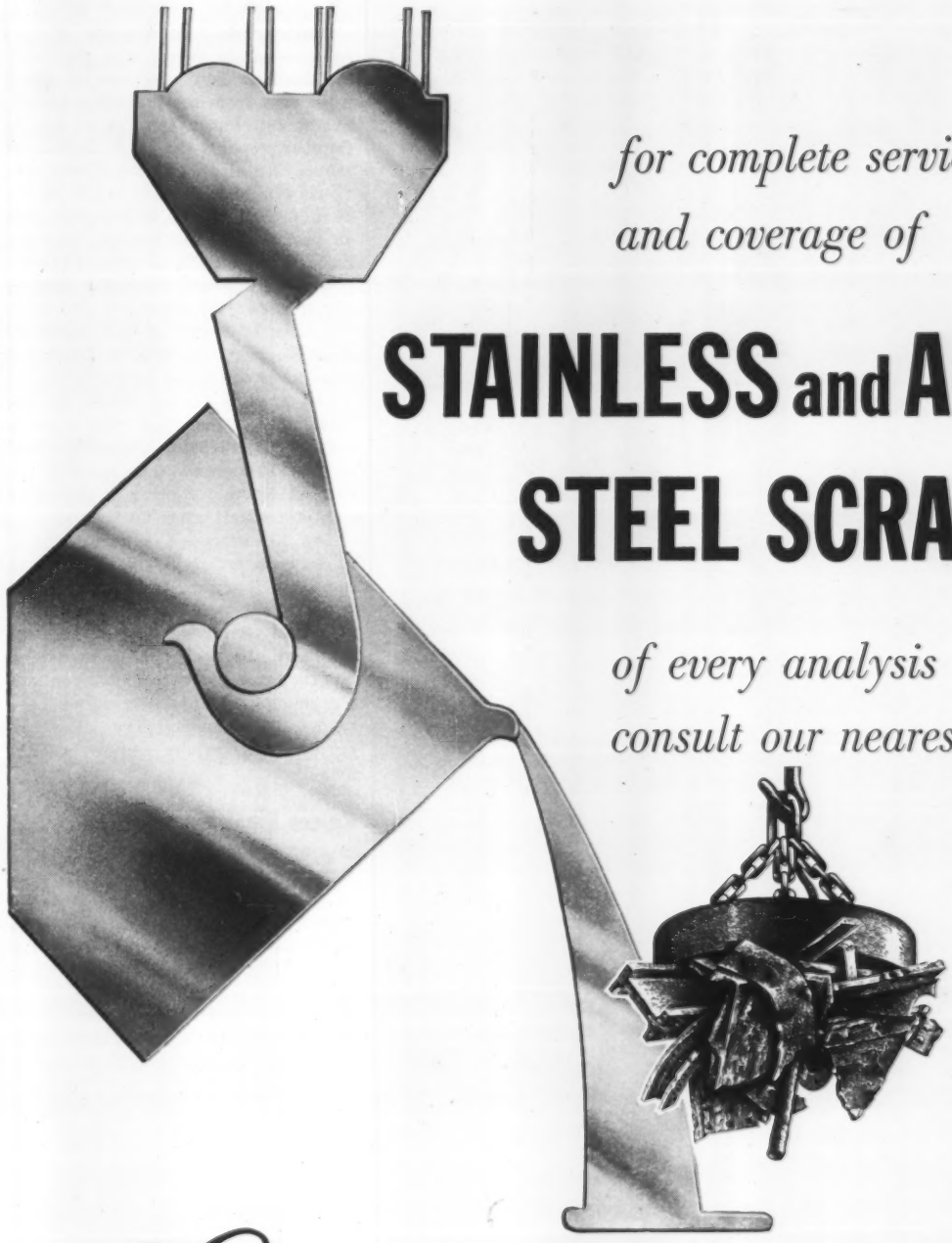
HAMILTON, ONT.

No. 1 heavy melting	45.50
No. 2 heavy melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	38.00
Mixed borings, turnings	19.00
Fails, remelting	54.50
Busheling, new factory: Prepared	43.50
Unprepared	39.50
Short steel turnings	27.50

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.



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(Concluded from page 165)

Washington—Consumption of ferrous materials (scrap and pig iron) in December last year was up about 2 per cent from the preceding month, but it fell under the record set in October, reports the U. S. Bureau of Mines. Total melt in the month was 12,628,476 gross tons, of which 51 per cent, 6,496,796 tons, was scrap, and 49 per cent, 6,131,680 tons, was pig iron. This compares with 6,441,351 tons of scrap and 4,973,223 tons of pig iron in November.

Stocks of scrap in the hands of consumers at the end of December were 6,437,794 gross tons.

Los Angeles—Scrap dealers are apprehensive. They feel that imports may further depress prices here and at San Francisco. The market has calmed down, following a period of unprecedented price fluctuation.

San Francisco—A slightly stronger tone is noted in the local scrap market. Recent top-heaviness of supplies appears less in evidence.

Seattle—Scrap dealers' receipts are off since the recent drop in prices, but they are adequate for current requirements. Mill inventories are high. Total consumption is above normal. The export market is sluggish.

Raises Steel Export Prices

U. S. Steel Export Co. revised upward its list of published export prices on various steel products to reflect the higher freight rates on shipments to North Atlantic ports. The increases were made effective Mar. 10.

Pig Iron . . .

Pig Iron Prices, Page 153

Kaiser Steel Corp. advanced prices $1.50 per ton on basic and foundry pig iron for domestic shipment. This reflects the recent freight rate increase. The new prices, $66 on basic and $66.50 on foundry, became effective Mar. 12. Within its marketing area, Kaiser says it will continue to meet the published price of the lowest effective competition.

The recent rail freight rate increase of 6 per cent has advanced delivered prices at several points. From Bethlehem, Pa., the governing base for New York city, the new prices are $65.01 for No. 2 foundry and $65.51 for malleable; for Newark, N. J., $63.70 for basic, $64.20 for No. 2 foundry, $64.70 for malleable and $65.20 for bessemer. On shipments to Philadelphia from Swedeland and Chester, Pa., delivered prices are 10 cents a ton higher; they are substantially higher from some other

furnaces serving the area. How much this will retard shipments from the more remote points remains to be seen.

Tool Steel . . .

Tool Steel Prices, Page 152

Shipments of high speed and tool steel (excluding hollow drill steel) increased in January, compared with shipments in the preceding month and the like month a year ago, reports the American Iron & Steel Institute. Total shipments in the month were 11,113 net tons, against 7822 in December and 10,777 in January, 1955.

Structural Shapes . . .

Structural Shape Prices, Page 148

Stringency in structural shape supply appears as pronounced as ever. No easing is in prospect before the third quarter at earliest. At that time the leading eastern producer is scheduled to have facilities available for the increased production of wide flange sections, which are particularly scarce. But even with this additional capacity, there is no assurance supply will be adequate, especially in view of the heavy amount of construction in prospect.

An increasing amount of building is being planned and released. The stringency in structurals, however, is resulting in diverting an increasing proportion of projects to reinforced concrete construction. This trend is especially noticeable in small bridges, schools, institutional buildings and light commercial construction where reinforcing steel is either called for or specified as an alternate material.

Unit and builders' contract quotations are more frequently in excess of engineers' estimates in the New England area. This is particularly true in the case of long-term construction projects.

Kaiser Steel Corp. raised prices on carbon structurals, including wide flange beams, $1 per ton; on alloy structurals, $2; and on high strength low alloy shapes, $1. The increases reflect higher freight rates.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

6500 tons, assembly and body plant, Chevrolet Motor Division, General Motors Corp., Warren, O., to R. C. Mahon Co., Detroit.

2340 tons, section, state Schuylkill expressway, Philadelphia, through Lipsett Inc., New York, to Pusey & Jones, Wilmington, Del.

2200 tons, office building, Acme Steel Co., Riverdale, Ill., to American Bridge Division, U. S. Steel Corp., Pittsburgh; LaSalle Construction Co., Chicago, is general contractor.

1300 tons, 5-story office building, Houston, to Capitol Steel Co., Houston; Farnsworth & Chambers Co., Houston, general contractor.

500 tons, office and bank building, Union Mutual Life Insurance Co., Portland, Me., to Bancroft & Martin Rolling Mills Co., South Portland, Me.; Consolidated Contractors Inc., Portland, general contractor.

400 tons, including 100 tons of bar joists, school, Hull, Mass., to West End Iron Works, Cambridge, Mass.; White Construction Co., Boston, general contractor.

300 tons, five state bridges, Southbridge-Sturbridge, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Gilbane Building Corp., Providence, R. I., general contractor.

250 tons, structurals and bars, parochial school, Fairfield, Conn., to Leake & Nelson Co., Bridgeport, Conn. (structurals) and Fireproof Products Co., New York (bars); E. & F. Construction Co., Bridgeport, is general contractor.

225 tons, structurals and bars, addition, nurses' home, Norwalk Hospital, Norwalk, Conn., to Port Chester Iron Works, Port Chester, N. Y. (structurals), and Bethlehem Steel Co., Bethlehem, Pa., (bars); Wadhams & May Co., Hartford, Conn., is general contractor.

220 tons, addition, American Casualty Co., Reading, Pa., to Reading Metalcraft Co., Reading.

200 tons, addition, nurses' home, hospital, Harrisburg, Pa., to Dauphin Steel & Engineering Co., Harrisburg.

200 tons, addition, public service building, Portland, Oreg., to Isaacson Iron Works, Seattle.

145 tons, library, Furman University, Greenville, S. C., to Greenville Steel & Foundry Co.; Daniel Construction Co., Greenville, general contractor; reinforcing bars to Connors Steel Co., Birmingham.

STRUCTURAL STEEL PENDING

4400 tons, eight-plane hangar, Boeing Airplane Co., Moses Lake, Wash.; H. S. Wright & Co. Inc., Seattle, bids $7,356,360 for concrete construction; Robert E. McKee Co., Los Angeles, is low for steel at $7,342,000.

3700 tons, Port of New York Authority pier, Brooklyn, N. Y.; Bethlehem Steel Co., Bethlehem, Pa., is low bidder.

2500 tons, section, state thruway spur, Westchester county, New York; Felix Contracting Corp., Mt. Vernon, N. Y., is low on the general contract.

2000 tons, junior high school, Allentown, Pa.; bids Mar. 29.

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500 tons, junior high school, Lower Marion Township, Pa., Mar. 27.
420 tons, channels, Navy, east and west yards; bids to General Stores Supply Office, Philadelphia.
325 tons, overpass, Southeast expressway, Savin Hill district, Boston; Wes-Julian Construction Co., Dedham, Mass., is low on the general contract.
280 tons, $2-million Rogue River Valley Memorial Hospital, Medford, Oreg.; bids in for shapes; general contract bids in June; A. D. Harvey, Medford, consulting engineer.
275 tons, lift-span bridge, York river, York, Me.; Callahan Bros., Mechanics Falls, Me., low on general contract at $391,083.
225 tons, addition, sanitorium, General State Authority, Philadelphia; bids Mar. 28.

REINFORCING BARS . . .

REINFORCING BARS PLACED

850 tons, replacement piers 4 and 6, Navy shipyard, Boston, to Concrete Steel Co., Boston; Raymond Concrete Pile Co., Boston, general contractor; 90 tons, fabricated structural steel to West End Iron Works, Cambridge, Mass.
175 tons, laterals, block 19, Columbia Basin project, to Bethlehem Pacific Coast Steel Corp., Seattle.
165 tons, school, Hull, Mass., to Northern Steel Inc., Medford, Mass.; White Construction Co., Boston, general contractor.
100 tons, five state bridges, Southbridge-Sturbridge, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Gilbane Building Corp., Providence, R. I., general contractor.
100 tons, 15-story office building, Houston, to Peden Iron & Steel Co., Houston; Farnsworth & Chambers Co., Houston, general contractor.

REINFORCING BARS PENDING

471 tons, Garden State parkway, contract No. 207, section 1-A, Bergen county, N. J.; bids to be opened by the state highway authority, Red Bank, N. J., Mar. 29.
107 tons, Washington state overcrossing, Spokane, Wash.; general award to Henry Hagman, Cashmere, Wash., low at $71,455.
104 tons, also 65 tons of shapes, Evergreen pumping station, Quincy, Wash.; Big Bend Inc., Seattle, is low to the Bureau of Reclamation.

PLATES . . .

PLATES PENDING

9000 tons, sheet steel piling, Rocky Beach dam; bids to Chelan county, P.U.D., Wenatchee, Wash., Mar. 29.
2400 tons, Mercer Island water supply line, Seattle, 36-in. and 24-in. line; Thorburn & Logozo, Seattle, low at $1,289,618 to Seattle for steel pipe; Scheumann & Johnson, Seattle, low at $1,083,819 for concrete pipe.

PIPE . . .

CAST IRON PIPE PLACED

1195 tons, 8 and 24-in., Latham Water District, Colonie, N. Y., to U. S. Pipe & Foundry Co., Burlington, N. J.

STEEL PIPE PLACED

2750 tons, pipe piling, replacement piers 4 and 6, Navy shipyard, Boston, to Albert Pipe Supply Co. and Davidson Pipe Co., New York; Raymond Concrete Pile Co., Boston, general contractor.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Seaboard Air Line, 25 diesel switching engines, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Florida East Coast, 70 gondolas to Magor Car Corp., New York, and 35 covered hopper cars to the Pullman-Standard Car Mfg. Co., Chicago; purchase authorized by Federal Court.
Pacific Great Western, seven rail diesel cars, to Budd Co., Philadelphia.

RAILROAD CARS PENDING

Hudson & Manhattan railroad, 50 air-conditioned passenger cars; permission to purchase granted by Federal Court.

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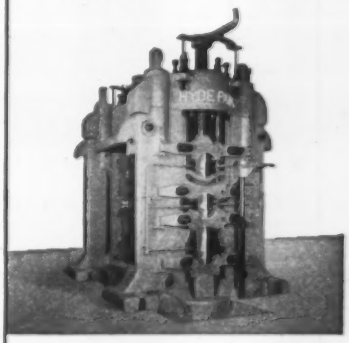
Hyde Park

RED CIRCLE Rolls ALLOY-CHILLED

Rolling Mill Equipment

For more than 50 years Hyde Park Steel Mill equipment has been helping American industry lead the world—equipment such as—



Bar Mills
Merchant Mills
Sheet and Strip Mills
Pinion Stands
Roller Tables
Reduction Drives
Stretcher Levellers
Guillotine Shears
Sheet Mill Shears
Roll Lathes
Special Machinery
Machine Work

For finer finish, long life and greater tonnage, specify Red Circle Rolls.

Hyde Park
FOUNDRY & MACHINE CO.
Hyde Park, Westmoreland Co., Pa.
ROLLS
ROLLING MILL MACHINERY
GREY IRON CASTINGS

General Contractor: Donald M. Drake Co.; *Architects:* Lawrence, Tucker and Wallman; *Structural Engineers:* Cooper and Rosé; Fabrication and erection, including high-strength bolting, by Bethlehem Pacific.

14-Story Medical Building Has High-Strength Bolting

In this typical installation picture, the nut is being drawn up on the Bethlehem High-Strength Bolt by means of a pneumatic impact wrench, as a holding wrench grasps the bolt head firmly.

This attractive new structure is the University of Oregon Medical School, in Portland. The 14-story building accommodates 277 patients and has extensive facilities for medical research. The steel members making up its 1170-ton frame were joined by Bethlehem High-Strength Bolts rather than by riveting.

Because of the saving in erection time they make possible, Bethlehem High-Strength Bolts are ideal for connecting structural steel members. They save time because they can be installed quickly by means of a calibrated pneumatic impact wrench. And not only does the wrench draw up the nut rapidly, it also applies sufficient torque to provide permanently tight joints.

Relative freedom from noise is another advantage of high-strength bolting, making it particularly desirable in areas where undue noise would be objectionable. For a pneumatic impact wrench is less noisy than a riveting gun.

Bethlehem High-Strength Bolts are made of strong carbon steel. They are heat-treated by quenching and tempering, and can be relied on to fully meet the requirements of ASTM Specification A-325.

If you would like to have more information about high-strength bolting, we suggest you call in one of our engineers. Just get in touch with the nearest Bethlehem office, or drop a line to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

The Webb Corporation, Webb City, Mo., specializing in heavy duty bending rolls of the type shown at left, has long depended on Cleveland worm gear drives. Above is end frame of bending roll with worm gear set in place.

2½" plate bender driven by CLEVELAND worm gearing

HIDDEN from view, the heart of this bending roll is its Cleveland worm gear drive. Year after year, it transmits power smoothly from motor to the forming roll which curves heavy steel plate into perfect cylinders.

For many years Webb has listed Cleveland as standard equipment on its Model 16-L and other heavy duty machines. Webb's experience proves that worm gearing, as manufactured by Cleveland, withstands the extreme pressures of bending cold steel plates—as much as 2½" thick—and actually improves with use.

Whenever you need a drive that will keep its efficiency and stand up through years of severe service, specify a Cleveland Worm Gear Drive. Write for Catalog 400. The Cleveland Worm and Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Drives

WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

Industry Here Finds Savings in the Stars

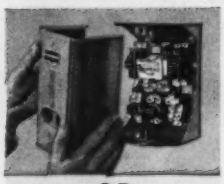
Cutler-Hammer Three-Star Motor Control

Thousands of electric motor users now know the three silver stars on the nameplates of the new Cutler-Hammer Three-Star Motor Control are no meaningless decoration. They stand for three entirely new standards in motor control value and performance . . . for important practical economies no industrial plant can afford to ignore.

Compare Cutler-Hammer Three-Star Control with all other control and *see* the difference. It installs easier . . . so much easier that savings in installation costs often pay for this control. It works better . . . so much better that this control often pays for itself many times over just by the production interruptions it avoids. It lasts longer . . . so much longer that this control *never* requires maintenance care or cost in all normal use. Make your own comparisons and *know*.

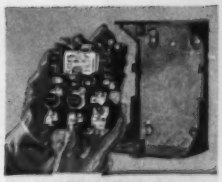
Your nearby Cutler-Hammer Authorized Distributor is stocked and ready to serve you. Order from him today. CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
★ ★ ★
MOTOR CONTROL
C-H



3-D Accessibility

Removing the wrap-around cover bares the entire starter for three-directional accessibility. It is wide open at front and both sides. You can see everything and reach anything. Wiring the starter is so simplified and complete inspection is so easy no detail is ever neglected.

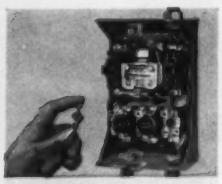


Unit Panel Construction

The entire starter mechanism can be removed from its case by simply loosening three screws. With mechanism out of the way, mounting case, connecting conduit and pulling wires is a cinch. A great time saver. No skinned knuckles. No damaged starter mechanisms.

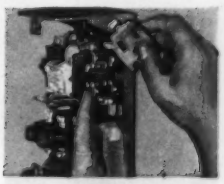
Full Three-Phase Protection

Only *three* overload relays can provide positive three-phase protection to stop needless motor burn-outs and production interruptions. And only Cutler-Hammer offers three overload relays in standard starters to avoid the costs and delays in special construction.



Adjustable Overload Coils

Only the accurate adjustment of overload protection permits motors to work harder without damage. Now more important than ever with newer type small frame motors. Adjustable overload coils here provide an accuracy of 3% instead of 10% to 12% in other makes of control.

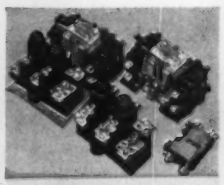


Superlife Vertical Contacts

Now the famous Cutler-Hammer dust-safe vertical contacts have been doubly improved. New light-weight design cuts bounce to reduce arcing. Also, arcing is now pressure-quenched. Contact maintenance care and costs are ended for all time in normal control uses.

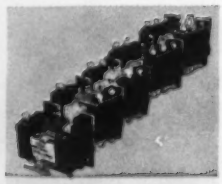
For Control Panel Designers

New Cutler-Hammer Three-Star Motor Control is star-studded with exclusive new features that provide opportunities for better circuit planning, for compact control panels, for better motor protection and better control performance. Write now on company letterhead for panel design handbook giving complete data.



New Control Components

All parts of the Three-Star Starters in NEMA Sizes 0, 1 and 2, as well as the complete starters on convenient unit panels, are available as components. Electrical interlocks provide additional control circuits as needed.



New Control Relays

Finest of control relays. 10 and 15 Amp. 2-3-4-5-6 poles. All contacts instantly convertible from NO to NC or vice versa. NO or NC status seen at a glance without removing cover. New armored coils color coded for voltage and frequency.

New Oil-Tight HD Pushbuttons

Amazingly compact, one-hole mounting, oil-tight, heavy-duty pushbutton units. Wide choice of button types and colors. Easily added additional contacts permit almost unlimited circuitry. Selector switches and indicating lights to match.